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THE

AMERICAN JOURNAL OF THE MEDICAL SCIENCES

AUGUST, 1913

ORIGINAL ARTICLES

EXPERIENCES WITH STEINMANN'S NAIL-EXTENSION METHOD IN FRACTURES OF THE FEMUR.[1]

By John C. A. Gerster, M.D.,

ADJUNCT SURGEON TO MOUNT SINAI HOSPITAL; ASSISTANT SURGEON TO THE CITY (BLACKWELL'S ISLAND) AND J. HOOD WRIGHT HOSPITALS, NEW YORK.

The essential part of Steinmann's[2] method consists of a nail which transfixes the soft parts and bone, and which is the sole point of attachment for suitable traction upon the lower fragment. In other words, the bone and soft parts are transfixed by a drill which is left in place with both its ends projecting.

Apparatus. The steel nail is 3½ mm. thick, 18 to 20 cm. (7 to 8 inches) long; the ends should project 2½ to 3 cm. beyond the skin (Fig. 1). The nail may be driven through the bone either by a simple handle resembling a clock key, or by a bit and brace, or by a geared hand drill (Fig. 2). An adjustable pair of tongs (Fig. 3), the limbs of which are joined by a suitable thumbscrew, forms the most convenient means of attaching extension apparatus to the nail ends.

In describing the typical procedure, let us take, for example, the treatment of a fracture of the femoral shaft at its middle third. The sterilized nail and drilling mechanism are fitted together and placed in readiness. The entire limb is brought close to the margin of the table or bed, so as to prevent interference with the drilling that is to follow. One assistant grasps the patient's ankle and, maintaining traction, elevates the leg, while the operator who is "sterile" applies full-strength tincture of iodine to the skin and does the necessary draping. The leg is then lowered, so that

[1] Read before the Surgical Section of the New York Academy of Medicine, January 3, 1913.

[2] Nagel extension der Knoche brüche, Neue Deutsche Chirurgie, 1912, Band i; British Med. Jour., November 30, 1912, p. 1235.

ankle and knee are close to the edge of the table. Another assistant having sterilized himself, assumes management of the broken limb. The anesthesia (gas) is now started. The assistant steadies the limb (outer margin of the foot must stay vertical), at the same time pulling the skin of the thigh upward. The point of the nail is inserted horizontally and at right angles to the shaft *a finger's-breadth above the upper margin of the external condyle*. As soon

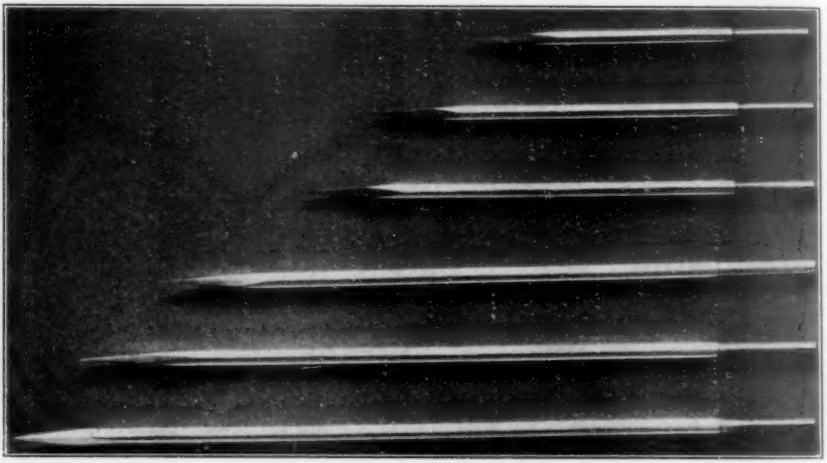


FIG. 1.—Solid nails of varying lengths. The points are sharpened on four sides; the heads are round in order to fit the chuck of the hand drill.

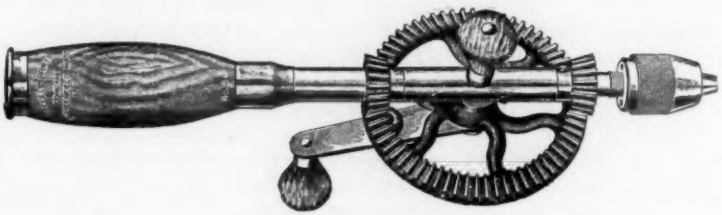


FIG. 2.—Geared hand drill.

as the bone is touched, drilling is begun (Fig. 4). The operator controls the drill with both hands and leans his body, either chest or groin, against the breast-piece of the drill. The resistance which at first is encountered, lessens after a while, for penetration is easier after the corticalis is passed, as the cancellous tissue offers less resistance. Again, progress is slower as the corticalis of the opposite side is encountered. Finally, this also is passed and

the nail point may be felt emerging from the bone. The skin overlying the nail point is pulled upward by the assistant and the

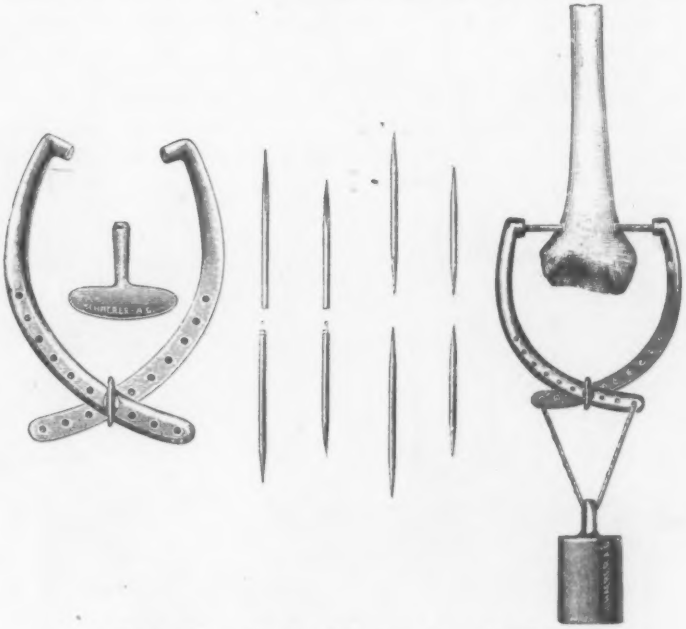


FIG. 3.—Tongs with nails, solid and two piece, and handle.

FIG. 4.—Transfixing the lower end of the femur. (Steinmann.)

point finally emerges. Drilling is stopped when the two nail ends project equally on either side of the limb. The narcosis is then stopped. The skin which the penetrating nail point has carried away from the leg is now pushed back on the nail to the level of the adjacent skin. Tincture of iodine, then aristol, and lastly collodion are applied to the skin where the nail emerges. Small flat pieces of folded gauze are transfixed by the nail points and run down the nail shaft to the skin.[3] A figure-of-eight bandage holds them in place; it is well for some turns of the bandage to be transfixed by the nail points.

FIG. 5.—Case VI. Nail in supracondylar position. Note wire fastened to ends of crossed limbs.

The extension apparatus is now attached to the nail. The two limbs of the tongs are applied so that the thumbscrew holding them comes uppermost—each limb is applied separately—the screw being inserted in that hole of either limb which most readily falls in alignment. The ends of a short piece of wire are fastened through the outermost holes of the crossed limbs of the tongs (Fig. 5). At the centre of this wire is attached the main traction wire or rope leading over a pulley at the foot of the bed down to the suspended weights. The thigh is placed in semiflexion. The leg is horizontal or the foot may be lower than the knee. The heel should not touch the bed. Hard pillows, sandbags, or suitable splints may be employed to maintain this position. The pulley

[3] Another nail may be used to make holes in the gauze, so that it readily slips over the rounded head of the nail which is in place.

at the foot of the bed must be placed so that the wire leading from the tongs is in line with the axis of the semiflexed thigh (Fig. 6).

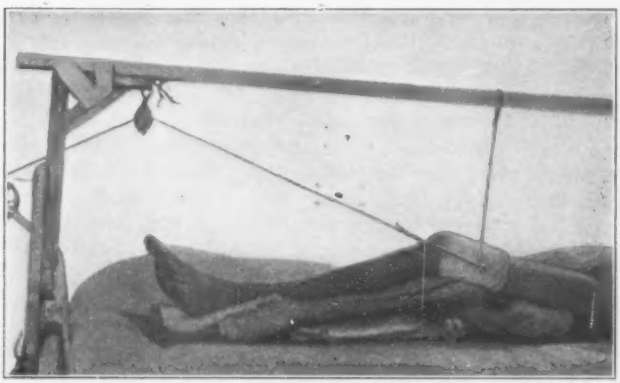


FIG. 6.—Case V. Note traction wire in line with axis of thigh, also suspension of outer end of nail to prevent eversion (rotary displacement).

Naturally the amount of weight to be used depends upon the individual case. In a recent fracture of an adult femur, with 5 cm. shortening, 18 to 20 pounds are usually adequate. It is very convenient to use a small spring scales registering up to 40 pounds, to ascertain how much weight is being applied (Fig. 7).

FIG. 7.—Scales.

Countertraction may be obtained by (*a*) raising the foot of the bed; (*b*) a well-padded perineal loop attached to the head of the bed, and (*c*) a foot-rest for the sound limb.

Shortening is usually overcome within a week. The broken limb should be allowed to stretch 1 cm. longer than its fellow. This renders proper approximation of the fragments easier. In transverse fractures, after proper reduction, overcorrection is no longer necessary, while in oblique fractures it is well to maintain ½ or 1 cm. overcorrection until union takes place.[4] After the shortening has been overcome, less weight is required to maintain the fragments in proper position. Undue lengthening is readily corrected by simply lessening the weight—the limb promptly shortens. Massage and passive motion may be begun five days after nail-extension

[4] According to the painstaking investigations of Wettstein (Beitr. z. klin. Chir., 1908, Band lx, Heft 3, p. 684, and Korrespondenzbl. f. Schweitzer Aërzte, 1909, No. 3, p. 73) fractured limbs shortened ½ to 1 cm. within the year after union had occurred. To counteract this we institute overcorrection in oblique fractures.

has been instituted. A good callus is usually developed by the end of three weeks. Steinmann states that, if possible, nail-extension should not be maintained longer than three weeks, and never longer than five weeks. Thirty-four days is the longest time I have personally seen the nail-extension maintained.

At the end of three or four weeks there is usually sufficient callus to justify removal of the nail. If the nail is solid the end which is to be drawn through is exposed, it and the adjacent skin are carefully cleansed with tincture of iodine, which is applied most thoroughly, after this the nail is withdrawn. The rounded head is firmly grasped by a heavy pair of wire pliers. The nail is first *rotated* to loosen it and is then extracted with a rotary motion. The knee should be steadied by an assistant. Under gas the actual extraction takes less than one minute. If the nail is in two pieces, the two halves are unscrewed and pulled out, each on its own side. Some tincture of iodine is injected into the nail holes and a wet dressing is applied until the skin is healed, usually within five or six days.

Most of my cases ran a slightly elevated temperature, between 99° and 100°, while the nail was in place; this dropped again upon removal of the nail. There were no signs of infection.

The subsequent treatment is that appropriate for any limb with a fresh callus—namely, avoidance of too much strain on the callus, at the same time employment of suitable passive and active motion.

I. Details of Treatment. A. *Location of the Nail.* According to Steinmann (1) it should avoid the hematoma at the site of fracture; (2) it should avoid the marrow cavity;[5] (3) it should avoid the joint capsule; and (4) it should avoid the epiphyseal line. Hence the nail is inserted one finger's breadth above the upper margin of the femoral condyle just behind the middle line of the bone—in other words, through the posterior half of the supra-condylar region just anterior to the adductor tubercle or its corresponding site externally.

In fractures of the lower third of the femur the nail is inserted through the upper end of the tibia 2½ fingers' breadth below the upper margin of the tibia on a level with the lower margin of the head of the fibula (Fig. 8).

B. *Methods of Inserting the Nail.* (1) Hammering has been found to cause too much pain at the site of fracture—the risk of splintering the bone is not great.[6] (2) Boring by hand is safer than

[5] At the point where the nail passes through the bone, there is enough cancellous tissue to prevent direct communication with the main marrow cavity.

[6] In a recent case of Dr. William H. Bishop's it was impossible to insert the nail by hand drilling because of the extreme hardness of the femur. The patient was a woman, aged fifty years, with a fracture of the upper third of the bone. A hammer was not available at the time, so the attempt to insert the nail had to be given up. At the subsequent plating the bone was found to be just as hard at the site of fracture, as it was near the condyles. The corticalis was very thick and there was cancellous tissue in the marrow cavity.

by electricity. (3) Incision of the soft parts is unnecessary and increases the likelihood of infection. Other modifications of the method, such as boring a hole and then inserting the nail, etc., can be placed in the same category. (4) It is necessary to pull the skin proximally, especially in supracondylar insertion of the nail, because if this is not done, as the limb is stretched, decubitus of the skin will occur to the distal side of the nail.

FIG. 8.—Positions for insertion of nails through femur and tibia.

C. *Type of Nail.* The two-piece nail apparently cannot be made of sufficient strength to afford a proper factor of safety against breakage at its joint. The nail has broken six out of the sixteen times I have used it. The weights used were never more than 20 pounds, usually about 15 pounds. Fortunately, when the tongs were used the broken nails were held in sufficiently good position to still maintain traction (Fig. 37). Breaking has occurred during insertion, during transport of the patient in bed to the *x*-ray room, and with the patient lying quietly in bed as late as the eighteenth day. I therefore prefer solid nails. Both head and point of the original nails are squared. They do not accurately fit the ordinary hand drill with a three-point contact chuck, hence I use nails with round heads which fit the usual types of drill (Fig. 2).

D. *Dressing.* Dressing should be dry and rather voluminous. The details have already been given.

E. *Attachment of Traction.* The tongs are most convenient for this purpose, but they are not essential. Braided picture wire, copper wire, or bandages (Figs. 9 and 14), may be used. In this case the ends of the nail are protected by corks. Spreaders may be necessary to prevent undue pressure of the wire against the skin in some instances, while in others an S-hook or wire loop may be required to prevent the end of the traction wire from slipping off a nail end. Where tongs are used the traction should be made upon the ends of the crossed limbs, not at the point where they cross (Fig. 6).

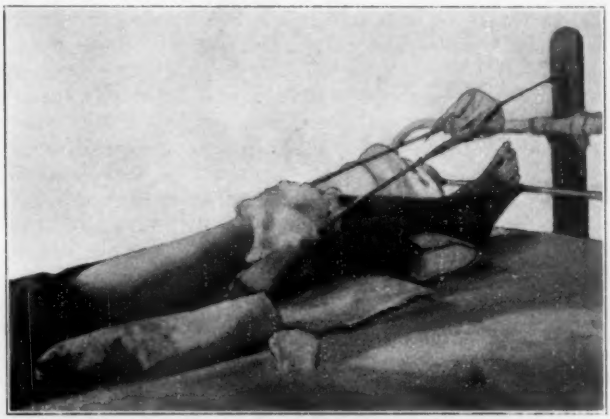


FIG. 9.—Case II. Pertrochanteric fracture. Tongs were not available, so bandages were fastened to the nail ends. Note small sandbag parallel to limb which supports the outer end of nail, thus preventing eversion.

F. *Anesthesia.* There may be a short general anesthesia, either laughing-gas or "aether rausch," or, there may be a local anesthesia (0.5 per cent. cocaine) in the cases where the former is contra-indicated. In intelligent adults it is possible to do without an anesthetic, for the pain of the boring is by no means unbearable (see Case VII). Indeed, most of the pain felt is at the site of fracture.

G. *Amount of Weight.* In recent fractures this varies between 10 and 30 pounds; in old fractures between 20 and 60 pounds. Steinmann speaks of one case where an old fracture with mal-union was refractured, nail-extension was applied, and a lengthening of 11 cm. was obtained within eight days. As said before, most of the stretching is done in the first week, after which much less weight suffices to maintain proper position.

H. *Control of Fragments.* The direction of the pull can be varied to adapt the lower to the upper fragment. Strong traction often

causes the upper fragment to follow the lower to a great extent—that is, lateral dislocation is corrected largely by extension alone (see Case VI).

FIG. 10.—Nail-extension applied to head of tibia. (Steinmann.)

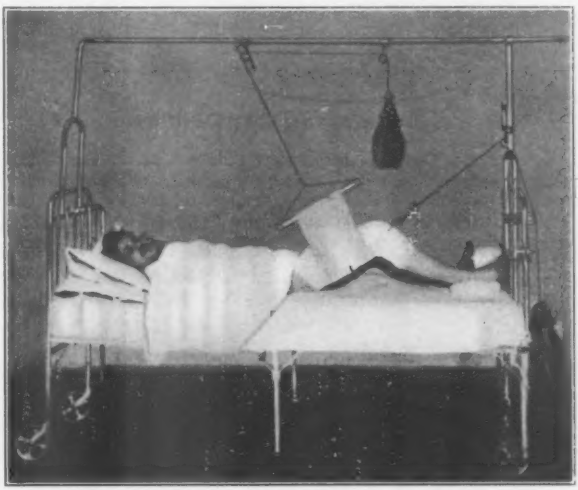


FIG. 11.—Nail-extension, with anterior pull at right angles to limb. (Waegner.)

Posterior dislocation of the lower fragment in supracondylar fractures is known to be especially difficult of correction. Flexion of the leg upon the thigh and dorsal flexion of the foot upon the leg lessens the pull of the gastrocnemii upon the lower femoral fragment which is displaced backward. Traction at right angles to the leg also aids in correction of this condition (Figs. 10 and 11).

Rotary displacement (eversion) is best corrected by suspension of one nail end. This is most conveniently accomplished by two uprights and a horizontal bar running the length of the bed, with a wire attached to the lateral (outer) end of the nail and to the horizontal bar (Fig. 7). In fact, the entire limb may be most conveniently suspended by this simple means.

It is unnecessary to review all the modifications and varieties of lateral traction and suspension which have been employed in other extension methods, notably in that of Bardenheuer. It goes without saying that they have been employed in the Steinmann method since 1907 with even better chances of success.

If possible, *x*-ray plates should be made before extension is applied; afterward controls can be made at proper intervals to make sure of proper position. As a matter of course the exposures should be made both from in front and from the side. Portable *x*-ray outfits are becoming quite common. With one of these exposures can be made without disturbing the limb. In hospitals without portable *x*-ray apparatus, a bed-truck may be used to transport the patient in bed into the *x*-ray room. A physician should accompany the patient upon this journey. The personal supervision of transport by one who understnds the *rationale* of the apparatus will prevent unnecessary pain to the patient and undue strain upon the apparatus. As said elsewhere, jarring by rather light weights (15 pounds) during transport has been sufficient to break the two-piece nail at the joint.

Even when the *x*-rays are not available, very fair results can be obtained by careful daily control with tape measure and fingers. While measurement is being made, the sound limb must be flexed to the same degree as the fractured one. It is well to measure from a number of points for the sake of control, for example, from the anterior spine to the nail, as well as to the internal malleolus.

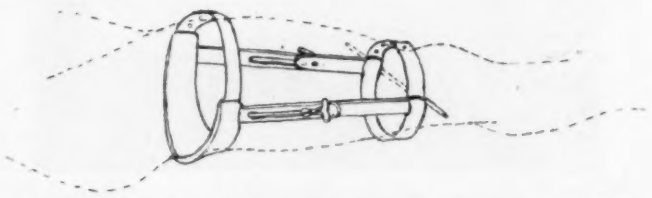


FIG. 12.—Splint for maintaining extension during transport to the *x*-ray room. (Steinmann.)

Steinmann has devised a sort of hip splint which can be adjusted so that its upper margin rests against the pelvis, and its lower margin impinges upon the projecting nail ends; it thus prevents shortening when traction is taken off. This splint was designed to facilitate the transport of patients to some place where an *x*-ray

exposure can be made (Fig. 12). From what I have seen, the less a patient is moved after extension is once applied, the better.

II. Objections Which Have Been Made Regarding Steinmann's Method. A. *Pain.* (1) Upon introduction of the nail an anesthetic is usually employed, yet under unusual circumstances it may be dispensed with (see Case VII). (2) During extension no pain is felt at the site of the nail. If traction is irksome the weights may be lessened for a few hours and then added again. (3) At removal of the nail there may be slight pain. By this time the nail is loose in the bone except when lodged in the head of the tibia, from which its extraction may require considerable force. It is well not to allow children or excitable adults to know that a nail is being employed. As long as they are ignorant of its presence they do not complain. A voluminous dressing applied to the leg satisfactorily conceals things.

B. *Infection* occurs either at the time of insertion or after two or three weeks. It is easy to insert the nail aseptically, but it is difficult to keep the region aseptic in the later stages. The granulations which have formed by the end of three weeks afford a fairly good protection to the bone at large. Small local infections have been known to occur, especially in long-continued cases of extension. These have all remained localized. Small circular sequestræ have come away. A small exostosis occasionally develops at the site of the nail. So far there has been no mortality from nail-extension—carried out according to the rules laid down by Steinmann. Fatal cases are known where the wound made by the nail has established communication with the fracture hematoma, thus converting a simple into a compound fracture.

C. *Injury by the nail to important nervous, vascular or articular structures.* There has been none at the time of insertion. Steinmann even reports a case where the nail had been run through the ankle-joint without causing any functional trouble.

The epiphysis has not been harmed, as shown by four years' observations upon children on whom this method had been employed. There was no lessened growth of the injured side.

D. *Injury by too great traction* has been ascribed to nail extension. There has been no instance of harm to the soft parts. An extreme example of what can be accomplished is shown by the case of Steinmann's, where 11 cm. lenghtening was obtained within seven days in a refractured malunion of five or six months' standing. There was no loss of function.

E. *Lax Knee-joint.* Strong diversity of opinion exists regarding injury to the knee-joint by traction (such as Buck's extension) applied to the limb below the knee. Naturally this controversy will promptly transfer itself to application of the Steinmann method in fractures of the lower third of the thigh where the nail is inserted through the head of the tibia; hence, a brief outline of the situation seems proper here.

Certain observers emphatically state that they have observed the most harmful effect upon the knee-joint from extension applied to the leg below the knee. Other equally competent authorities maintain that they have never seen any injury to the knee-joint from application of Buck's extension to the leg as well as the thigh, and furthermore insist that no adequate extension can be obtained by merely pulling on the skin of the thigh.

It is to be noted that Steinmann's method differs from Buck's extension in that the knee-joint is flexed, whereas in Buck's extension the knee-joint is fully extended. Perhaps there is less strain upon the ligaments when traction is applied to the partially flexed joint than when there is full extension. My own experience in this matter is not sufficiently extensive to be of much value. Steinmann states that he has never seen any distraction of the knee-joint from traction upon the tibia. He also states that effusions into the joint disappear with great rapidity after extension is made; this likewise has been my own experience. The transient inability fully to extend the knee rapidly disappears under appropriate massage and passive motion.

F. *Delayed Union.* None has been observed so far. On the contrary, Steinmann says that firm union is usually obtained in seven or eight weeks, in some cases even as early as five weeks. The fact that both passive motion and massage can be employed while extension is going on certainly has much to do with prompt callus formation and union. No pseudarthroses have occurred.

III. ADVANTAGES. A. *Traction.* Less weight is needed for any given case than by other methods. More weight can be used than by any other method, and this without the risk of decubitus. The traction is continuous, not spasmodic, as in Codivilla's method or in Lane plating. In cases of long-standing malunion the soft parts may be so contracted that, after freeing their ends, the bones cannot be placed end-to-end without undue tension upon the soft parts which may cause cessation of circulation in the distal part of the extremity or even rupture of important structures. It is in such cases that the continuous traction safely accomplishes its purpose in from three to five days.

B. *Painlessness.* Once the nail is in position there is no pain due to its presence. In fact, after a few days the patients are apt to become careless because of their freedom from pain.

C. *Control of the fragments,* especially of the lower one, is more certain by this method than by any other except the open operation.

D. *The small site of attachment* makes the method available in the compound fractures where other traction methods are either difficult or impossible of application.

Simplicity and possibility of improvisation are qualities of the method which cannot be too strongly praised. Steel drills and the apparatus for driving them, or long nails, together with some

wire or stout cord, are obtainable almost anywhere, and they can be made to serve one's purpose.

The value of the method in military or naval serivce or in inaccessible regions, is readily apparent. The Prussian army uses it. It is time-saving, effective, and easily learned.

Comparison of Results. With Buck's extension we have more or less shortening and stiffness of the knee, which lasts for a long time afterward. With the Steinmann method there is no shortening, and the transient inability fully to extend the knee-joint quickly disappears. In some cases it is never present.

With Lane plating we have the risk of grave infection if the operation be done by any except the skilled, and in any case, somewhat delayed union. In certain exceptional cases even with no infection, union may be delayed for months, and long immobilization of the knee-joint in such cases has resulted in what amounts to an ankylosis. With the Steinmann method there is much less risk of infection (there have been no fatal cases so far); there is no delayed union (in the average case), and the joints have little, if any, impaired function.

The method of Ransohoff,[6] whereby the point of a pair of ice-tongs are lightly driven into the bone, is a recent modification of the same principles governing nail extension. The site of attachment with tongs is larger than with the nail.

IV. Indications for Using Nail Extension. A. *Recent Fractures.* Fractures of the femoral neck constitute debatable ground. Impacted fractures of the neck against the head had better be left alone. Intracapsular fractures in the young show brilliant results when spiked in their proper position at operation. Where operation is contraindicated, Whitmann's abduction is the most rational method for properly approximating the fragments. Pertrochanteric fractures, on the other hand, give excellent results with nail extension (Cases II and V).

In fractures of the shaft, in very obese individuals where adhesive plaster is not effective, nail-extension is indicated (Case VII).

In supracondylar fractures it affords better control of the lower fragment than any other traction method.

In short, nail extension is indicated wherever the usual traction methods fail. A case of von Eiselsberg's, quoted by Steinmann, illustrates this. In a fresh fracture of the lower third of the femur it was found that there was such pressure upon the popliteal artery that the pulse was obliterated. Traction by the usual adhesive plaster did no good. Nail extension was then resorted to and the pulse returned.

B. *Old Fractures.* This is a field which has been practically untouched by traction methods. The fact that nail-extension can

[6] Lancet-Clinic, August 17, 1912.

be employed with success at a considerable time after the fracture has occurred, makes it of value when a fracture is complicated by extensive abrasions of the skin or by acute disease, such as delirium tremens or pneumonia. Here one can wait until recovery has taken place before applying extension. The method has been successfully used in fractures of forty days' standing in which usual traction methods have been of no avail.

In malunion with much overriding, operation followed by the Steinmann method is the only way in which an ideal result can safely be obtained. The malunion is broken up, and afterward nail-extension is applied. Naturally, larger weights (up to 60 pounds) must be employed. This procedure has been used as late as three to six months' after malunion had taken place.

In pseudarthroses, rubbing of the bone ends together, followed by application of extension, has been suggested. When this is not sufficient the bone ends may be cut down upon and freshened, the wound then closed and nail-extension applied.

As a preliminary to Lane plating in cases where that method is indicated (interposition of soft parts, etc.) nail-extension is excellent, because the absence of shortening lightens the operator's task fully 75 per cent.

To conclude, in certain cases nail-extension is the only method to be used, in others it is an aid to previously existing methods.

I take the opportunity of expressing my gratitude to Drs. Howard Collins, William H. Bishop, A. G. Gerster, John A. Wyeth, Seth Milliken, and Ernest Fahnestock for their kindness in allowing me to employ this method in their services and for the privilege of publishing their cases, the abstracts of which follow (Cases I, II, III, V, VI, VII, IX, and X were presented at the time this paper was read).

SYNOPSIS OF CASES.

CASE I. James L., aged four and one-half years (Dr. Howard Collins' service, City Hospital, Blackwell's Island).

June 26, 1912. A board fell from a building and struck the patient, causing an oblique fracture of the middle third of the left femur. Admitted to City Hospital on June 27.

July 2. Sixth day after fracture. Steinmann two-piece nail; supracondylar insertion. Laughing-gas anesthesia; 6 pounds traction; 1 cm. shortening.

July 9. ½ cm. overcorrection; 4 pounds traction.

July 22. ¾ cm. overcorrection.

July 23. Twenty-first day. Nail removed. (*X*-ray, Fig. 13.)

July 25. Limbs equal; nail holes clean.

August 3. Child can raise entire limb to vertical position; flex and extend knee. Nail holes, two small clean, granulating spots.

October 5. Function perfect; runs and walks without a limp.

Epicrisis. This was a restless, active child who had no pain after the first three days, and who had to be restrained by loops of bandage at the ankle, knee, hip, and armpit in order to maintain proper alignment of fragments (Fig. 14).

FIG. 13.—Case I. Plate taken twenty-one days after fracture; no shortening.

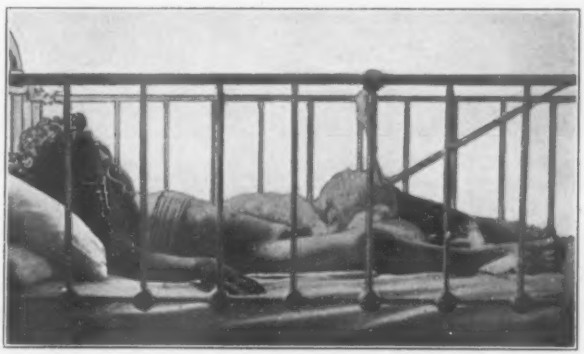


FIG. 14.—Case I. Illustrating restraint necessary with active children to maintain proper alignment of fragment.

CASE II. James R., aged sixty-five years (Dr. Howard Collins' service, City Hospital, Blackwell's Island).

June 14, 1912. Admitted to Bellevue Hospital with a fracture of the neck of the femur.

June 21. Transferred to the City Hospital, with a shortening of 1½ inches and marked eversion.

June 22. Buck's extension with 10 pounds traction applied.

July 1. Sixteenth day after fracture 3 cm. shortening. Steinmann two-piece nail; supracondylar insertion under laughing gas; 21 pounds traction (Fig. 11).

July 12. ½ cm. shortening.

July 18. Eighteenth day after insertion. Nail broke at joint; inner half loose and removed; wet dressing applied to nail hole. Outer half was solid (Fig. 13), and sandbag, which had been placed underneath its end to prevent eversion, and to maintain the limb in proper position, was left undisturbed.

July 19. 1 cm. shortening; *x*-ray plate (Fig. 15).

FIG. 15.—Case II. Pertrochanteric fracture nineteen days after extension applied.

FIG. 16.—Case II. The same five months later.

July 23. Outer half of nail removed.

July 27. Nail holes healed; good union; massive callus.

July 29. 2 cm. shortening; patient comfortable.

August 14. Patient is encouraged to sit up and to try to walk on crutches.

August 28. Shortening nearly 3 cm.; good flexion and extension; some limitation to inward rotation. Edema of right leg and ankle, which has existed since patient was out of bed on crutches, gradually subsiding under massage.

December 1. Patient has been on crutches for the past three months. Has now been encouraged to walk.

December 23. Bad dermatitis of right leg and ankle from undue use of chloroform liniment.

December 30. *X*-rays (Fig. 16) show neck joined to the shaft at more of a right angle than previous picture; firm union.

Epicrisis. The nail broke on the eighteenth day. Traction was being made by bandages fastened to the projecting ends of the nail. No tongs were available at that time, and it was not feasible to apply other methods of traction. Had extension been maintained for a week longer, it is probable that no shortening would have ensued after removal of traction. Where the two-piece nail has broken with the tongs grasping its ends it has been found possible to still maintain traction, since the tongs hold the fragments of the nail at approximately right angles (see Case XII).

CASE III.—Mary H., aged seven years (Dr. Howard Collins' service, City Hospital, Blackwell's Island).

August 24, 1912. Fell three stories to the ground from a fire-escape, striking a shutter, and other fire-escapes on her way down, sustaining a fracture of the lower third of the right femur. A projecting fragment could be felt in the popliteal space. There was no obstruction to the circulation; 3 cm. shortening.

FIG. 17.—Case III. Supracondylar fracture before reduction.

August 26. Second day after fracture. Under laughing-gas anesthesia. A two-piece nail driven through the head of the tibia; 8 pounds traction.

August 28. ½ cm. shortening.

September 3. *X*-rays show lower fragment displaced outward (Fig. 17).

September 9. Reduction of fragment under laughing-gas, by Dr. A. L. Sherman.

September 19. Twenty-fourth day, nail removed.

September 26. Excellent union; patient can raise heel from bed, flex the leg completely, and extend it to within a few degrees of full extension.

October 10. *X*-rays (Figs. 18 and 19) show excellent position.

October 18. Out of bed for the past few days; can now fully extend leg; limps less and less as time goes on.

October 19. Discharged from hospital.

November 14. Some effusion of knee-joint, which the mother says has been present since leaving the hospital. Limp barely perceptible.

FIG. 18.—Case III. Both knees after reduction.

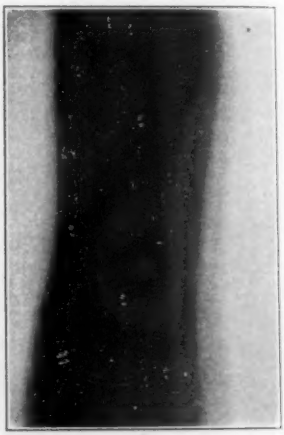


FIG. 19.—Case III. Final result.

December 24. Effusion of knee gone; walks and runs with perfect freedom.

Epicrisis. There was union within one month. Slight limitation to full extension, which was present for a time after removal of the nail, gradually disappeared. The effusion of the knee-joint was present for five or six weeks after discharge from the hospital, and subsided without treatment.

CASE IV.—John H., aged eighteen years (Dr. Howard Collins' service, City Hospital, Blackwell's Island).

September 30, 1912. Was hit by an automobile mud-guard while roller-skating in the street. He was knocked senseless, and sustained a fracture of the middle third of the left thigh.

October 1. A large effusion of the knee-joint. Shortening about 4 cm.

October 3. Fourth day after fracture, Steinmann's two-piece nail inserted through the head of the tibia; 10 pounds traction.

October 5. Shortening 2.5 cm.; 18 pounds traction. Effusion of the knee-joint gone.

October 10. 1 cm. overcorrection.

October 23. Twenty-first day. Nail removed. Some force necessary because of its firm fixation in the tibia.

October 25. Plaster spica applied, reaching to the hip. At this time there was slight lateral mobility, considerable callus, and it seemed as though the upper fragment had moved anteriorly. There was slight lateral mobility of the knee-joint; no limitation to passive motion of the knee-joint.

FIG. 20

FIG. 21

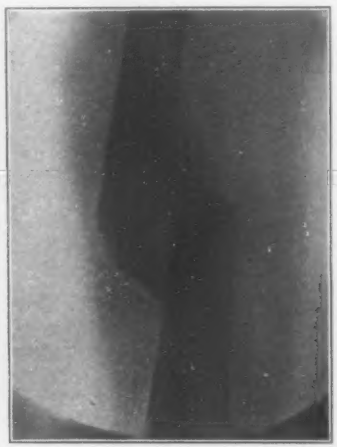


FIG. 20.—Case IV. Transverse fracture seen from in front.

FIG. 21.—Case IV. The same seen from the side. The plate taken at the same time as Fig. 20. was lost, but it showed the same position as this plate (Fig. 21), which, together with Fig. 22 was taken two months later.

October 31. *X*-rays (anteroposterior view) show good position (Fig. 20). Lateral view (Fig. 21) shows overriding of transverse fragments. This was the first time this case had been *x*-rayed.

November 6. Cast removed. Up in rolling-chair.

November 15. Patient slipped getting into chair and fell on the floor.

November 17. There was marked bowing and 2½ to 3 cm. shortening. Supracondylar insertion of nail was suggested as the best available traction. This was refused by patient. Because of this, Buck's extension (15 pounds) and lateral traction (15 pounds) at the greatest prominence of the bowing were applied.

November 26. Bowing of thigh has gone; lateral traction discontinued.

December 1. Buck's extension discontinued; 1 cm. shortening present at this time.

December 22. Patient has lain quietly in bed the past three weeks, the leg being in the same position that it was while Buck's extension was being maintained. There was 2 cm. shortening. Flexion beyond 60 degrees limited. Full extension. Some effusion of knee-joint ever since discontinuance of Buck's extension.

December 24. *X*-rays show good callus and slight overriding of the fragments (Figs. 21 and 22). There is no angulation of the thigh.

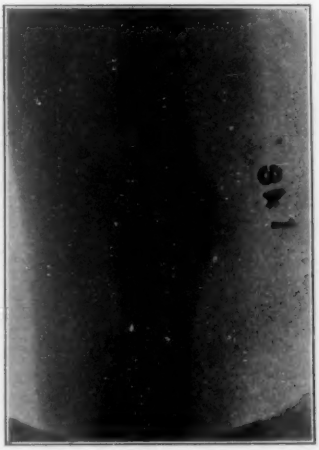


FIG. 22.—Case IV. Front view two months later than Fig. 20.

December 30. Home on crutches, with a perfectly solid union.

Epicrisis. There were no facilities for controlling treatment by the *x*-rays. Because of the extensive effusion of the knee-joint and because of the contusions of the thigh, it was deemed wiser to apply traction to the head of the tibia rather than to run the risk of possibly infecting a hematoma of the thigh. A better result might have been obtained had a solid nail been used in the supracondylar region and had it been possible to follow effects of traction with the *x*-rays. It seemed unwise to use more than 20 pounds weight with traction on the head of the tibia.

CASE V.—John M., aged thirty years (Dr. William H. Bishops' service, Flower Hospital, New York.)

October 10, 1912. Fractured neck of femur while trying to stop a runaway. His foot slipped and the wheel struck him, knocking him down. An *x*-ray plate taken at the time showed an extracapsular fracture passing through and below the greater trochanter.

Unfortunately this plate was lost. There was a shortening of 1¼ inches (3.5 cm.).

October 14. Fourth day after fracture, under gas and oxygen; two-piece nail; supracondylar insertion; 15 pounds traction; external rotation prevented by suspending the outer end of the nail to a horizontal bar above the patient which ran the length of the bed (Fig. 7).

November 3. 1 cm. shortening.

November 12. Twenty-nine days after insertion, nail removed; no shortening; can raise knee slightly.

November 14. Plaster spica applied.

December 10. Cast removed (four weeks). Has good function.

December 11. *X*-rays show excellent position (Fig. 23).

FIG. 23.—Case V. Oblique fracture beginning just below lesser trochanter and going upward through greater trochanter two months after fracture.

December 29. Walks fairly well with one crutch.

Epicrisis. Extension twenty-nine days; cast twenty-four days Uneventful course. Good result.

CASE VI.—Helen B., aged eleven years (Dr. A. G. Gerster's service, Mt. Sinai Hospital).

October 8, 1912. Was run over by an automobile. Sustained an oblique fracture of the left femur at its middle third.

October 12. Vaginal smear contained gonococci.

October 17. Ninth day after fracture, under gas and ether anesthesia; supracondylar insertion of a two-piece nail; 12 pounds; 2½ inches shortening (5½ cm.).

October 20. 1¼ inches (3 cm.) shortening.
October 24. Equal.
October 27. 1 cm. overcorrection. Traction lessened to 9 pounds. Slight adduction corrected by lateral pull 3 pounds.

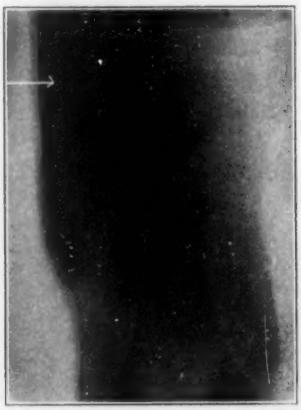


FIG. 24.—Case VI. Oblique fracture of the shaft a few days after fracture.

FIG. 25

FIG. 26

FIGS. 25 and 26.—Case VI. After one week of extension.

October 31. Equal.
November 8. Twenty-second day after insertion, nail removed. Good fibrous union. Slight false point of motion.

November 9. Pain in the right loin. Temperature, 100°.

November 10. Vomited a number of times; pain in right loin increased; temperature, 104.2°; urine contained many red blood and pus cells.

November 11 and 12. Temperature, 103° to 104°. Gradually subsided by lysis. Nail holes healed.

November 14. Cast (spica) applied to hip and thigh only, allowing movement of knee.

November 15. Temperature normal.

November 21. Urine contains very little pus; no albumin.

November 23. Cast removed; no shortening. Some bowing of the leg anteriorly. Has been walking on crutches for the past five days.

FIG. 27

FIG. 28

FIGS. 27 and 28.—Case VI. Final result eleven weeks after fracture.

November 25. Discharged.

December 23. Fell and bumped knee.

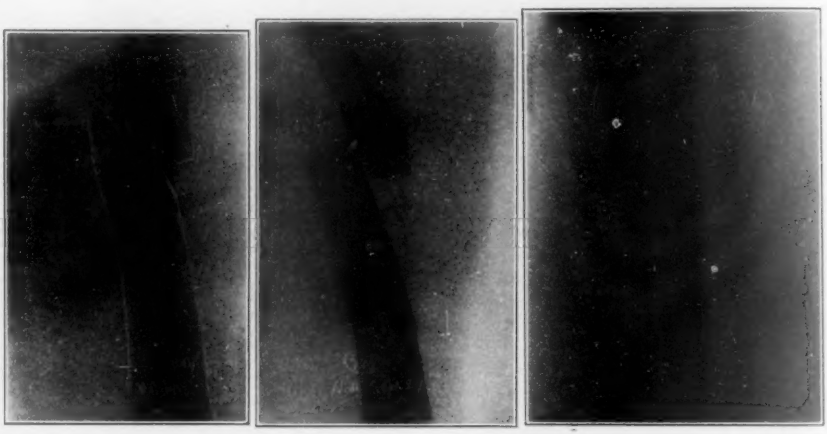
December 27. Returned to the hospital for *x*-rays, which show good position (Figs. 27 and 28), Moderate effusion of the knee, which was treated with cold compresses.

Epicrisis. Nail applied on the ninth day remained in place twenty-two days. Convalescence complictaed by a smart pyelitis, probably due to the vaginal infection. Slight anterior bowing, probably due to lack of support below knee while patient was wearing plaster cast. No infection of nail holes. This was the only case of the entire series in which it was possible to follow the effect of traction with the *x*-rays.

CASE VII.—Michael N., aged fifty-four years (Dr. S. M. Milliken's service, Lincoln Hospital, New York).

An extremely stout man who had varicosities of both legs for a number of years past. Non-alcoholic. He had been so asthmatic that he had been unable to work for the past six years. Five months before fracturing his thigh he contracted erysipelas of the right leg, and had stayed at home until the day of fracture, September 22, 1912, when he went out. He tripped stepping off a curb on his way to church and sustained a fracture of the upper third of the right thigh. Was taken to the Lincoln Hospital, where it was found, that besides the fracture, he had a mitral insufficiency and was extremely emphysematous. There was one inch shortening and marked eversion. A plaster spica was applied. The cast compelled him to lie flat; he nearly suffocated from his asthma that night, so that the cast had to be cut away from the abdomen in order to permit his sitting up.

FIG. 29 FIG. 30 FIG. 31



FIGS. 29 and 30.—Case VII. Tracing of fracture of shaft in an obese man, 250 pounds, about 5 feet 4 inches high, two days after fracture.
FIG. 31.—Twenty-five days later; good callus.

September 23. (*X*-rays, Figs. 29 and 30).

September 24. Cast removed.

September 26. Fourth day after fracture, shortening approximately 1½ inches. Steinmann solid nail 21 cm. long; supracondylar insertion. The thigh was so thick that the nail ends barely projected. No anesthesia; pain not extreme.

September 27. Tongs applied; 15 pounds traction.

October 2. Traction increased to 30 pounds; one inch shortening.

October 16. Nineteenth day, nail removed. Local decubitus from tongs where they grasped the end of the nail. Three-fourths inch shortening; no anterior motion; slight lateral motion.

October 17. *X*-rays (Fig. 31) show slight overlapping and large callus.

October 25. Dressing removed; wounds healed.

November 1. Lifted entire leg from bed; active motion.

November 12. Stood up for a moment (the first time) while being weighed; weight, 250 pounds. Out of bed in chair.

December 1. Out on crutches; no limitation of motion.

December 8. Discharged; on crutches.

Epicrisis. An obese asthmatic individual, wholly unsuited for Lane plating or the usual Buck's extension, in whom the nail-extension gave most satisfactory results.

FIG. 32.—Case VIII. Taken shortly after fracture.

CASE VIII.—Arthur A., aged twenty-seven years (Dr. Ernest Fahnestock's service, J. Hood Wright Hospital, New York).

November 8, 1912. A counter-weight of an elevator struck his left thigh, causing a fracture at the middle third and rupture of the internal lateral ligament. (*X*-ray, Fig. 32.)

November 22. Fourteenth day after fracture. Had been in a posterior splint for the past sixteen days. Slight fever ever since admission; 9 cm. shortening. Two-piece nail; supracondylar insertion; laughing-gas anesthesia; 16 pounds traction.

November 23. Temperature, 102°. No local discomfort. General condition good.

November 24. Temperature normal. Traction, 21 pounds.

November 25. 2 cm. shortening. Traction increased to 23½ pounds.

December 1. 1 cm. shortening.

December 4. No shortening. Edema of leg, which was present up to now, is nearly gone.

December 24. Upon releasing weights there is 1 cm. shortening; plenty of callus; still some motion.

December 26. Nail removed (thirty-fourth day); 1 cm. shortening afterward.

December 29. 2½ cm. shortening; nail holes clean; union improving; 30 degrees motion in flexion of knee (*X*-ray, Fig. 33).

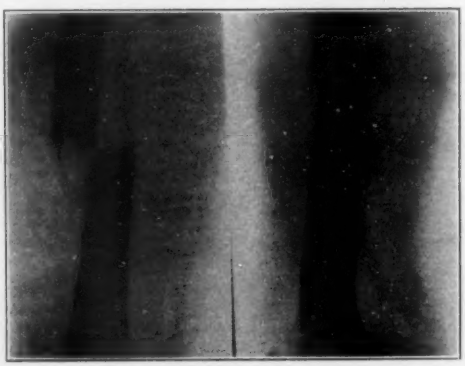


FIG. 33.—Case VIII. Two months later. The nail extension was applied fourteen days after fracture (9 cm. shortening). At present 1 cm. short—front and side view.

January 3, 1913. Firm union. Function of knee much better.

Epicrisis. Nail-extension was applied fourteen days after fracture and was maintained thirty-four days. The 9 cm. shortening on the sixteenth day was reduced to *nil*. There was delayed union. This accounted for the shortening which came after discontinuance of traction. A two-piece nail was used, and it was deemed unwise to use more than 23 pounds traction for fear of breakage.

CASE IX.—Charles H., aged fifty years (Dr. John A. Wyeth's service, Polyclinic Hospital).

November 22, 1912. Patient was standing on the end of a freight train, which was backing down. The train suddenly stopped, threw him off, and he became unconscious. He sustained a traumatic amputation of the big and second toes of his right foot, a fracture of the upper third of his right femur, and a concussion of the brain.

November 25. Third day after fracture, solid nail inserted under laughing-gas anesthesia; 12 pounds traction; one inch shortening.

November 28. No shortening. Traction wire broke.

December 1. 1 cm. shortening.

December 16. Twenty-first day, no shortening; apparent union; nail removed; removal required considerable force.

December 21. Wounds healed promptly.

December 30. *X*-ray (Fig. 34). Revealed a badly comminuted fracture of the neck and trochanter. The fragment indicated by the arrow was palpable and led to the diagnosis made above. Today there is three-fourths of an inch shortening. Abduction will be maintained by a cast.

FIG. 34.—Case IX. Comminuted fracture of greater trochanter and shaft (thirty-eighth day).

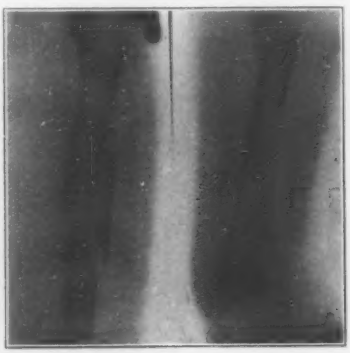


FIG. 35.—Case X. End-result six weeks after comminuted fracture of shaft. No shortening.

Epicrisis. The crushed condition of this man's foot would have made proper attention to it difficult had a Buck's extension been applied. As it was, dressings were not hindered by the nail-extension apparatus. This case emphasizes the value of controlling clinical observations by the *x*-rays.

CASE X.—Charles C., aged nine years (Dr. Ernest Fahnestock's service, J. Hood Wright Hospital, New York.)

November 23, 1912. Patient was hit by an automobile and sustained a fracture at the middle third of his left thigh.

December 2. Eight days after fracture there is a large effusion of the knee-joint. 2 cm. shortening. Under laughing-gas anesthesia; a solid nail inserted through the head of the tibia; 10 pounds traction, which was increased later to 15 pounds.

December 4. 1 cm. overcorrection; effusion less.

December 13. Effusion of the knee-joint gone.

December 24. Twenty-one days after insertion, nail removed easily; good union; large callus.

December 29. Nail holes clean. Can raise knee twelve inches from bed; active or passive flexion beyond this is painful.

December 30. Out of bed on crutches. (*X*-ray, Fig. 35.)

CASES IN WHICH NAIL-EXTENSION WAS APPLIED AND WHICH DIED FROM CAUSES HAVING NO RELATION TO THE METHOD EMPLOYED.

CASE XI.—Alice K., aged fifty-two years (Dr. Collins' service, City Hospital).

September 13, 1912. Patient broke her right hip.

September 20. Supracondylar insertion of Steinmann's two-piece nail by Dr. H. H. Janeway.

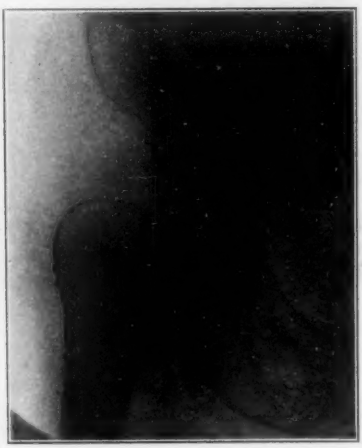


FIG. 36.—Case XI. Total absorption of femoral neck three days after fracture in a syphilitic subject. The head lies against the shaft.

September 21. Wassermann reaction was reported strongly positive. On account of her debilitated condition, she bore antispecific treatment poorly.

October 7. Seventeenth day after insertion, local pain around the nail; temperature, 102°.

October 10. Twentieth day, fever having continued, nail removed; 2 drams of pus escaped; nail was found broken at the screw-joint; but the ends of the tongs had kept the pieces of nail in position at approximately right angles to the bone.

October 11. Temperature normal; discharge less.

October 15. No union. *X*-rays show total absorption of the femoral neck, so that head rests against shaft (Fig. 36).

October 18. The patient has been gradually declining for the past two weeks. During the past week there has been no fever; she became much weaker this day; went into coma and died. Diagnosis: Death from syphilitic myocarditis. No autopsy.

Epicrisis. This was a fracture of the neck of the femur in a markedly syphilitic subject. Total absorption of the neck in thirty-two days. It is possible there was a previously existing gumma of the neck of the femur, predisposing to fracture at that point. The patient was intractably filthy in her habits. Inflammation of the nail hole, which occurred on the seventeenth day after insertion, promptly subsided after removal of nail and application of wet dressing. Patient died of her myocarditis a week after her temperature had reached normal. The nail broke at its joint under no undue strain. (Traction between 10 and 15 pounds.)

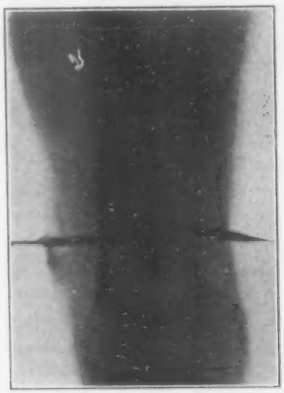


FIG. 37.—Case XII. A two-piece nail which broke at the joint. The pieces were held at approximately right angles by the tongs and continued to exert traction.

CASE XII.—Fritz D., aged forty-eight years (Dr. Collins' service, City Hospital).

October 27, 1912. A confirmed drunkard, fractured his thigh while intoxicated. Had delirium tremens four days after admission. Moderate icterus. Condition gradually improved.

November 1. Two-peice nail inserted; no anesthesia; 19 pounds traction.

November 2. Comfortable.

November 3. Again developed delirium; irrational. Developed a pneumonia, to which he promptly succumbed.

November 5. *X*-rays, taken while in delirium, show broken nail held in place by tongs (Fig. 37). No autopsy.

THE RELATIONS OF INTERNAL SECRETION TO MENTAL CONDITIONS.[1]

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The subject of internal secretion has aroused much interest among physicians during the last decade, and detailed investigation has furthered the work. As a matter of fact the relations of glandular secretions to the nervous system have been noteworthy. We find observations on the influence of the secretions on psychic conditions, to which may be added attempts to influence certain psychic conditions curatively by organic extracts (opotherapy), also the scientific movement which defines changes in the glands as phenomena resulting from psychic anomalies.

Nor have attempts been lacking to present clearly the matters in question, particularly the report of Laignel Lavastine at the Congress of Dijon and the reviews of Bauer, Marburg, Muenzer, and others.

Observations on operated animals are of particular importance, the investigations on the hypophysis by Cushing, Aschner, and others being interesting examples.

In the effort to give an outline of our present knowledge, based on the work done by myself and other investigators, I feel that the facts are incomplete, that hypotheses must play too great a part therein. Still, the investigations have accomplished sufficient to present a review which is not uninteresting, and it is necessary to compile such a review, premature though it may seem, if only to point out the way which furture studies must follow.

The oldest problem of internal secretion is the action of the genital glands. The peculiar effect of the testicle extracts observed by Brown-Séquard was the first evidence of an internal secretion.

In older literature it was affirmed that not only the entire nature of woman, but her character as well depended on the reproductive organs. Heimont said, "Propter solum uterum mulier est quod est;" Chereau said, "Propter ovarium solum mulier est, quod est;" and Virchow's statment that a woman is a woman simply because of her generative gland is familiar. The peculiarities of her body and mind—in short, all the femininity which we admire in the true woman—are dependent on the ovary. This interpretation is not unimportant if we reflect that modern study of the brain, otherwise so rich in results, has not succeeded in discovering differences between the male and female individual

[1] Lecture delivered at the Medical Department of University of California, September 3, 1912.

which would be able to explain the psychic differences between both sexes.

So long as the genital glands do not enter into energetic function—in childhood—the secondary sexual characters are scarcely indicated. The psychic differences are often recognizable as early as the second and third year. become more marked in later years, and the differentiation becomes pronounced only after puberty. The study of this period of development becomes the more interesting when we compare the powerful *ascendente* with the later *decrescente* of the climacterium in man and woman.

Let us begin with man. Puberty is preceded by a certain unrest, a noticeable vacillation, sometimes a sort of fear; only then the erections and pollutions begin. The voice changes—it becomes rougher and deeper. The thyroid gland becomes larger; the genital and axillary hair appears, and the body grows more hairy in general; the beard becomes apparent; the epiphyseal cartilages begin to ossify. The psychic changes come into the foreground; childish plays are dropped; reading takes a higher course. New energy takes possession of the young man—the ambition to perform great deeds, to act for great ideas, and frequently the inclination to solve the world's problems. Anxious doubts as to the doctrines of religion, hitherto believed in with childish simplicity, vary with emanations of an unhealthy and exaggerated religious faith. Diffidence alternates with self-confidence and self-consciousness. Plans of reforming the world are formed. Conduct toward the female sex is strained. Games with girls are regarded with scorn, and the opinions of women in general are held in contempt. In odd contradiction to this, bombastic declarations often come freely from their lips; they are bashful in their association with women; and they adore some particular female, whom they would never venture to address, with the romance of a troubadour. Here we see strongly indicated what every man retains in some measure, and what every woman possesses—a certain unconscious antipathy, in some respects, to the other sex. There is here something mysterious—something that cannot be bridged over. In these young men there is also often a tendency to mysticism. Eroticism and mysticism are matters which often go hand in hand. It is the age of sentimentality, in which the German youth tries with more or less success to sing in the rhythm of Heine.

However, especially in those with a neuropathic tendency, this sentimentality becomes too deep. This is the times of the steadily increasing number of youthful suicides; also the appearance of youthful psychoses, which in their incipiency so often present a caricature of awakening sexual life.

The period of sexual tempest in adolescence is succeeded by the period of young manhood, also dominated by strong sexual emotions, which now follow quieter paths. But the tempestuous

still has the upper hand. The age of genuine love begins, which cannot be explained scientifically. The cortical excitability increases; often, also, the intellectual capacity. Birds sing at the time of mating. Man's imagination broadens; the poets sing their best songs; the musicians compose their most beautiful music; discoverers and inventors often do their best work when in love (Ostwald).

In observing the processes before and after coitus the influence of the secretion of the sexual gland is much in evidence. The strong, stormy, psychic excitement, at times combined with a certain mental incapacity, which precedes coitus is often followed by a sort of transitory antipathy to the same woman so passionately longed for a short time before. Coitus at normal intervals acts favorably on the mental condition, and excesses are injurious.

Observation of onanists gives further proof of the influence of genital secretion. It is generally believed by physicians that isolated onanic acts do not materially injure the individual, but when the secretion is excited too often those who are addicted to this habit become weak, abulic, averse to society, and show decrease of intelligence and memory.

The much-discussed question of sexual abstinence in vigorous men must be here touched upon. Some men seem to tolerate easily this abstinence, but in others psychic symptoms may be observed in the stage of abstinence, unrest, melancholy, general discontent, symptoms which sometimes decrease after sexual satisfaction. This symptom-complex seems to occur more often in persons with a neuropathic tendency.

Men also present a peculiar picture at the time of cessation of the internal secretion of the genital glands, although not in the same degree as woman at the critical age. The picture has been described in detail by Mendel. We have to deal mostly with men of forty-seven and fifty-seven years of age, who show reduced or absent sexual desire and potency, but who were often previously healthy and strong. Now they are nervous, emotional, often break into tears, have attacks of perspiration, palpitation of the heart, show lassitude, and are sleepless. At times they have attacks of giddiness and headache; often there are diffuse bodily pains and paresthesias. The memory grows dull, mental interests decrease, and the patients manifest hypochondriac ideas.

But other psychic changes in aging men, changes that are beneficial to humanity, must not be forgotten. At the decline of sexuality psychic rest often develops—peaceful calm, a clear view and review of life, and a tendency to mildness. These are the men who no longer produce new and enthusiastic ideas, but who as teachers and guides fully grace their position. As judges they are in their fittest place. The men with strongly secreting genital glands have too much temperament for such office, and

too much passion. A German statesman is alleged to have said that only two things grow better with age, wine and judges.

Experiences in regard to castration are particularly instructive. In the animal kingdom this operation is often practised on domestic animals—stallions, bulls, rams, cocks, and birds. We know that if these animals are castrated early they not only develop differently in body, but change their psychic conduct and lose their liveliness and aggressiveness. Not only is the outward appearance of the early castrated known, but the peculiarities of their character have been often discussed; they are thought to be cunning, secretive, avaricious; they often love dress and jewelry to excess, and they have no great executive ability. Moebius states that in Italy eunuchs have frequently had great success as music virtuosi, especially as singers; but that in productive art, that is, composition, they are not successful. The influence of late castration, mostly for surgical reasons or because of injuries, has been frequently discussed in literature. In these persons bodily changes are little noticeable; on the other hand, conditions of depression and psychoses are found relatively often.

In certain conditions associated with inferior or undeveloped genitals, in infantilism and eunuchoids (Tandler and Gross), lighter or more severe degrees of imbecility are not infrequently found. Men with even slight genital affections often suffer from severe depression.

From what has been said, we see what a great influence the genital organs, with their secretion, have upon men.

In regard to women, we find that the time of puberty is characterized not only by the somatic signs of the appearance of menstruation and the secondary sexual attributes, but also by psychic changes. Young girls become restless, nervous, apprehensive, dreamy. Months often pass before the proper equilibrium is reëstablished. The psychoses present at this time differ from those in boys. The progress of intelligence becomes marked in boys during the puberty. Girls between the ages of eighteen and twenty-two, that is, when sexual conditions have calmed down, often attain a remarkable mental elevation (Moebius). The strong imagination, quick conception and comprehension are often remarkable at this age.

In the further progress of her life the periodical menstruation shows not only somatically as bleeding, but also in the entire make-up of the woman and here, again, psychic factors are evident. Menstruation is preceded by a certain irritability and a slight psychic stagnation. When the hemorrhage appears women have a feeling of lassitude, become abulic, and less active intellectually. Icard (in Havelock Ellis, from whose studies we quote liberally) observes that in perusing the diary of a young girl it does not require much perspicacity to discover the pages which were written

during menstruation. Among 80 women who were arrested for resisting the police, Lombroso found only 9 who were not menstruating. Among 56 female shoplifters, Legrand du Saulle found 35 who were unwell at the time of the crime. Suicides are known to be frequent at the time of menstruation. A. Pilcz found intramenstrual changes of the sexual organs in more than one-third of female suicides. The question of the not infrequent insanity during menstruation has likewise been discussed. Recent investigations have shown that menstruation in women is not a suddenly appearing and disappearing event. On the contrary the organism seems to be in a continuous wave-like movement which is not found before the beginning or after the close of menstruation in childhood or old age. Perhaps the much-discussed variability of mood may be explained thereby, the often inexplicable vacillation of mood in the sexually mature woman.

Pregnancy and the puerperium play a peculiar part in a woman's life. As regards the puerperium, we have to deal only with that which takes its course without fever. Even women otherwise not psychopathically inclined usually become nervous and easily depressed during the time of pregnancy. Neuropathic natures at such times often have a tendency to severe depressions, with a tendency to suicide. The frequency of psychoses in this condition is well known. In exceptional cases, remarkable contrasts to this picture are observed. Some women almost habitually suffer from severe depression, being mentally most calm, even during pregnancy.

The psychic disturbances of the climacterium, the most dangerous and critical age of woman, have also been much discussed. At the time when menstruation begins to be irregular—sometimes even months or a year before—women fall into a strange state of unrest, sometimes accompanied by sexual overexcitability. Deep depressions, a tendency to outbreaks of weeping, periods of irritability, psychic vacillation, and a decrease of intelligence are well-known conditions in most women at this time. But in some cases it reaches a high degree: psychoses of depressive character are often established. The gossipy character of the old hag has also been much discussed. The messenger of misfortune in fairy tales is almost always an old witch. If for reasons of local diseases castration is performed in women, phenomena appear, similar to those above described, only less pronounced and the effect of late castraction on the mental condition is not nearly so great as on men; but literature has many examples of psychoses after the operation mentioned. Nothing accurate is known about the psychic condition of women after early castration. The undoubted influence of genital affections of the most varied kinds on the mental condition of women has been much discussed. How deeply rooted the conviction of this influence has been is shown by the opinion of the connection between hysteria and the genital organs and by

the repeated attempts of gynecologists to cure serious hysterias by castration.

The thyroid gland is the most interesting organ for the study of internal secretion. It is indeed the only organ in which we can differentiate hyperfunction and hypofunction clinically, and experimentally. The hyperfunction appears most distinctly in Basedow's disease. In 1909 R. Stern in Noorden's dispensary, reviewed my Basedow material, covering a period of twenty-five years, and found that we must distinguish certain definite groups. Basedow's disease is marked by rapid beginning and rapid growth of the struma, by pronounced trembling, extraordinary tachycardia, and increasing exophthalmos. These typical affections mostly befall individuals without hereditary tendency. In a number of cases, however, we have to deal with hereditary affected individuals, mostly persons who have for years been suffering from nervous symptoms (degenerative Basedow).

But the recognition resulting from investigation, that the so-called "formes frustes" differ greatly from the principal ones and have the tendency to change into the genuine, is important. They must be considered as a separate group of diseases. There are individuals who even in youth have a struma, though only a moderate one, which usually does not grow, or very little, afterward. The other symptom-complex develops sporadically only, and not to an unusual degree; the exophthalmos is often altogether absent or only indicated. In this group the mental condition is also changed. They are often grumbling, hypochondriac, melancholic, and egotistic persons.

The study of the cases is more important in which psychic anomalies may appear in various forms. But one tendency is often pronounced—namely, the predominance of manic features. The individuals are often excited, though we cannot exactly speak of a psychosis. They are talkative, spasmodic in their thoughts and actions, and sometimes incline to witticisms. In conversation they often prefer erotic subjects, and are given to sexual excesses. In the acute psychoses of these patients there may be a predominance of manic features.

I remember the first case in my practice. It was that of a woman, aged twenty-one years, who grew rapidly nervous, and in whom there developed simultaneously the various components of the typical Basedow, with an unusually excessive exophthalmos. Except for a certain excitability the patient seemed normal, and she was sent to the seashore. But her mental condition changed for the worse. I hastened to see her, and when I entered the gate she came to meet me, singing gaily, her hair loose and wreathed with flowers. The physical disease lasted for several weeks. The excitement, which had abundant erotic features, grew considerably. There was no defect of intelligence, no pronounced confusion of

ideas, no hallucinations. After a few months the condition improved. Gradually the permanent cure of the psychosis resulted and at the same time the Basedow symptoms disappeared.

Opposed to the picture of Basedow disease, of hypertrophy of the thyroid gland tissue, we have the picture of atrophy and degeneration. The somatic and psychic pictures bear the relation, says Weigandt, of the photographic positive to the negative. Most striking is the condition of the adult myxedematous patients, with the typical absence of the thyroid gland. The principal factor is the complete lack of emotion. A considerable role is ascribed to the thyroid gland in emotional life. According to Levi and Rothschild it is the "glande de l'émotion." The similarity of the picture of fear emotion and that of Basedow's disease should be remembered, also the lid fissures, the protuberance of the bulbi, the trembling, the tachycardia, the congestions which alternate with pallor, the outbreaks of perspiration, the diarrheas, the trembling of the legs.

As emotional as are those afflicted with Basedow's disease, so lacking in emotion are the myxedematous. According to Charcot they may be compared to hibernating animals: dull-witted, indifferent, unable to work, disinclined to sexual activity, the memory gradually decreases, the power of judgment becomes minimal, and the patients often lie in bed apathetically for days, almost without desire for food or drink. Severe psychoses are by no means rare in these patients. The connection between the mental condition and lack of the thyroid gland may best be studied if thyroidin. be administered for therapeutic purposes. It is then often surprising to see the apathetic and indifferent become lively and communicative and evince signs of intelligence which would not have been considered possible a short time before.

The significance of the thyroid gland also becomes clear on examination of children with congenital or acquired myxedema. The mental inferiority of cretins, with defective or degenerative thyroid glands is well-known. The psychic picture may be improved by administering thyroidin (Wagner-Jauregg).

Muenzer refers to the well-known swelling of the thyroid gland, with processes in the genitals, in puberty and in pregnancy. In gravidity the hypophysis shows marked changes. There is a mutual action between the glands—every affection may be polyglandular—and some attribute the affection to a single gland.

We cannot leave this phase of the subject without a word on the parathyroid glands, the four accessory glands of the thyroid, which differ from the genuine not only in histological structure, but also in function. Clinical investigations (Jaendelize, Pineles, Vassale, Jenerali, Erdheim, and Riedl) have shown the probability of tetany being a consequence of the affection of these organs. In 1889 I described psychoses in individuals who had fallen ill of typical tetany.

At the culmination of the affection, which in Vienna appears in March and April, typical tetanic attacks appeared which subsided with the symptoms of somatic affection. Similar cases were also described by other authors, especially cases of a strumiprive or parathyreoprive form. The mood of those afflicted by tetany is not to be designated as normal, even if we do not consider the actual psychoses. These individuals are excitable, timid, uneasy, quarrelsome, and inclined to outbreaks of temper. Depression is occasionally present, but is not one of the dominant symptoms. In the psychoses the conditions of temper and excitement predominate. I found among my old patients with tetany several who had grown excitable and irritable. In those who had myxedematous phenomena the symptoms of mental lassitude appeared which were not recognizable in the other forms.

In strumectomized animals peculiar psychic changes have been described. Blum mentions hallucinations in strumectomized dogs, as well as changes of characteristics, idiocy, and pathologic motion phenomena. Horsley and Pineles saw similar phenomena in monkeys. Erdheim observed conditions of excitement in rats, and stated that these are connected in some way with tetany, as on the days when the animals are excited tetany often reappears.

Our knowledge of the thymus gland is still small, though Basch and Klosevoigt refering to the feeble intelligence of animals whose thymus had been extirpated, speak of an "idiotie thymopriva."

We know more about the so-called brain glands, the hypophysis (pituitary body) and the epiphysis (pineal gland—glandula pinealis), and during the last decade many important side-lights have been thrown on the question of their influence on mental condition.

Engel of Vienna, in his dissertation on the pituitary body in 1839, gave expression to his ideas on this subject.

The hypophyseal affections have to be divided into two large groups, the acromegalia and the dystrophia adiposogenitalis (Fröhlich's type). Psychoses of various kinds in these conditions have been described. Schuster has treated this subject in detail. He found that tumors of the corpus callosum probably cause psychic disturbances; frontal lobe tumors, 80 per cent., temporal lobe tumors, 66.6 per cent., the hypophyseal tumors, 65.3 per cent.

Boyle and Beadles among 3000 necropsies at the lunatic asylum found tumors in 20, 6 of them hypophyseal. The number of actual hypophyseal psychoses is somewhat overestimated. Large brain tumors which because of increase of brain pressure and destruction of brain parts may *eo ipso* call forth psychoses are encountered. But the fact that psychoses are so frequent in affections of the pituitary body gives food for thought, in spite of their association at times with destruction of tissue in other parts of the brain. I have seen many pituitary body tumors, and have noticed a

psychic change, a peculiar indifference, a certain contentment, a euphoria which is not in harmony with the symptoms, such as headache and blindness. The patients are calm, and have a childish confidence in the doctor. The sleepiness of the patients is pronounced, but if they are forced to arouse themselves, their intelligence has not suffered nearly so much as we would be led to believe by the outward impression they make.

The psychic factor may best be studied by observing operated cases. I have seen cases operated on either by the Schloffer (cases of v. Eiselsberg and Hochenegg) or the nasal method of Hirsch. It is remarkable how lively, agile, and communicative the patients become. The entire psychic condition of the corpulent partakes of the condition of individuals with constitutional obesity. The peculiar mental slowness, indecision, good nature, and sleepiness of these people is proverbial. Loss of hair is not uncommon.

It is not uninteresting to compare the acromegalic with the physiologic giants. They often have a peculiar heavy manner and lack of initiative. The psychic peculiarity of hypophysis patients, which we described in our report at the International Congress at Budapest in 1909, is of interest from the fact that the animal experiments of Cushing in Baltimore and Aschner in Vienna showed that in hypophysectomized dogs the psychic changes corresponded with those of human beings. According to Cushing, animals with hypopituitarism become psychically abnormal: at times they are lazy and sleepy, then playful and excited.

If in early childhood tumors (teratoma) develop on the glandular pinealis a picture is presented which is more intelligible since the observations of Gutzeit, Ogle, Oesterreich, Slavik, Neumann, Marburg, Bailey, and Jelliffe. The features of premature sexual development are combined with an unusual development of fat. In a boy, aged four and a half years, who had always been very large and somewhat fat, the genitals developed remarkably. In his fifth year erections appeared, the voice became deep and hoarse, and the body showed a hirsute appearance which corresponded to the age of eighteen or twenty years. He had the symptoms of a cerebral tumor (headache, vomiting, epileptic attacks, paralysis of the eye muscles, and choked disk). He died of scarlatina. The necropsy findings showed a teratoma of the pineal gland. One point in this observation is of importance, the early development of the mental condition. The boy was overintelligent, and had an inclination to discuss ethical philosophic questions. In his fifth year he showed the same psychic peculiarities that are displayed by youths during the development of puberty.

There were also signs of early psychic development in the cases of Oesterreich and Slawyk and Raymone and Claude. The hypothesis therefore was that the pineal gland was to be considered among the blood glands, and that it influenced genital development. Its

absence causes premature genital development and psychic development corresponding to the age of puberty. Descartes placed the seat of the soul in the pineal gland, and although in this form his belief cannot be upheld, still when a genius has once made an assertion, something of it will always remain.

Of the abdominal glands the pancreas and its internal secretion play a large part in relation to diabetes. Diabetics often show mood anomalies, and we speak of actual diabetic psychoses. We have no test for determining how far the psychic peculiarities depend on the secretory disturbances of the pancreas.

The study of suprarenal capsule affections gives us more positive points of knowledge. The secretion of these organs and their effect on the nervous system are generally known. The connection between disturbances of brain development and hypoplasias of the suprarenal capsules, is of importance in the subject under discussion. Leri in 3 cases of melancholia found destruction of the suprarenal capsules. At the clinic there are occasional cases of Addison's disease with a tuberculous destruction of the organs mentioned. These individuals are weak, exhausted, and hopleess, in contrast to the euphoric patients with tuberculosis of the lungs. Irritability and depression are almost always present.

Psychoses of various kinds have also been observed in which depression seems to predominate. In addition to the observations of Leri, we refer to the histories of Bonhoeffer, Vollerecht, Rodionow, Boinet, and Klippel.

From this review it will be seen that we know of a number of the effects of internal secretions on mental conditions, and how the development of the mind depends on these secretions. Brain anatomy helps but slightly in showing how higher mental development is to be explained. Perhaps the time will come when we shall learn to perceive how much depends on the individual structure of certain glands and on their individual internal secretion.

AN EXPERIMENTAL STUDY OF SODIUM BICARBONATE AND OTHER ALLIED SALTS IN SHOCK.

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In recent literature there is a vast preponderance of work on the various possible causative agencies of shock and practically a

dearth of investigations directed toward the therapeutic relief of this serious symptom-complex. Howell[1] in 1903, was led by a laboratory accident to investigate the physiologic action of sodium carbonate and found this salt to be an excellent cardiac stimulant in shock. Henderson,[2] in 1910, as a result of his extensive investigation of acapnia, suggested as a rational therapy for shock the prevention of loss of carbon dioxide (the carbon dioxide being lost chiefly as a result of hyperpnea and by exhalation from exposed viscera) and the replacement of such loss, as had previously occurred, by increasing the dead space of the respiratory tract. These two investigators furnish about the only new lines of therapeutic thought developed during the past decade on the subject of shock.

Howell's work is important in that it demonstrated both the pronounced action of sodium carbonate on the force of the heart beat and also the duration of this effect over a comparatively long period of time. According to Howell, the rate of beat was unaffected, and vascular tone, likewise, in all probability was not influenced. In severe degrees of shock, sodium carbonate did not yield the brilliant results secured by the use of this same drug in the more moderate cases (where the blood pressure registered 60 to 70 mm. of mercury); but even so, to quote Howell, the results were more hopeful "than those obtained by the use of other substances suggested as having value. Adrenalin, hypophysis extract, alcohol, and strychnine gave negative results or, at best, temporary and unimportant rises." The nucleus of Howell's work, though not expressly so stated by the author, lies in the thought that the pressor effect of sodium carbonate is due to its alkalinity. Dawson[3] extended Howell's work by using sodium bicarbonate, but in his experiments he induced shock by bleeding his animals, thus complicating an already complex set of phenomena by the added element of hemorrhage. Henderson's work, in its turn, is important in that it reviews and reëmphasizes the importance of carbon dioxide as a body hormone, and particularly in that it points out the absolutely fundamental fact that in all probability the low blood pressure which results from venopressor disequilibrium is not the principal causative factor of shock, as it is so generally assumed, but is rather the direct result of shock. Henderson's main line of thought may be sketched as follows: As a result of various factors—pain, excessive flow of afferent impulses, or exposure of viscera—there is a loss of carbon dioxide either by excessive lung ventilation or by direct exhalation from the viscera. Carbon

[1] Observations upon the Cause of Shock and the Effect upon it of Injections of Sodium Carbonate, Contributions to Medical Research, dedicated to V. Vaughan, 1903.

[2] A series of Papers on Acapnia and Shock, Amer. Jour. Phys., xxi, 126; xxiii, 345; xxiv, 66; xxv, 310; xxvi, 260; xxvii, 152; Johns Hopkins Bulletin, August, 1910.

[3] Changes in Heart Rate and Blood Pressures Resulting from Severe Hemorrhage and Subsequent Infusion of Sodium Bicarbonate, Jour. Exper. Med., 1905, vii, 1.

dioxide is an important though poorly understood regulator (hormone) of many of the vital functions (cardiac, peristaltic, respiratory, venopressor), consequently when the loss of carbon dioxide becomes quantitively sufficient these vital functions are thrown out of gear up to the point of compromise or further, even to cessation of activity. Contrariwise, balance may be restored by methods adapted to increasing the deficient carbon dioxide content of the blood. Henderson's[4] views have been vigorously attacked by physiologists, and his own data has been used to disprove his main thesis. But leaving aside all polemic discussion it may be stated fairly that if in accordance with Henderson shock is caused by acapnia or a lessened carbon dioxide content in the blood, then the direct introduction of carbon dioxide into the blood ought to be a powerful and fairly certain remedial agent.

On the above assumption we based the following series of experiments. Before describing our experiments, however, it must be stated that two essential facts were kept constantly in mind, namely: (1) Blood-pressure readings in shocked animals must be interpreted merely as expressing phenomena, coincidental with and not necessarily causative of shock. Attention is centred largely on blood pressure because it is conveniently measurable accurately and graphically, and because, in a sense, it furnishes an index of the degree of shock. (2) In the anesthetized dog there are remarkable spontaneous variations of pressure which, as far as can be determined, have nothing except a coincidental relationship with procedures aimed at either producing or relieving shock. These variations in pressure will necessarily be falsely interpreted unless a large number of control experiments are performed as routine work.[5]

Assuming the correctness of Henderson's assumption that shock is due to a deficiency of carbon dioxide in the circulatory blood, we attempted to check up his theory by supplying the blood stream directly with an increased quantity of this gas. For obvious reasons the demands of accurate experimentation would not be satisfied by infusing a solution of carbon dioxide in water or in an isotonic medium. In our earlier experiments we were deterred from introducing pure carbon dioxide gas into the circulation by the fear of gas emboli, therefore it was determined to use a molecular solution

[4] Henderson himself attempted to increase the carbon dioxide content of the blood by two methods, both of which are open to criticism. His method of infusing physiologic salt solution saturated with carbon dioxide is open to question on account of the bulk of fluid necessarily injected (Henderson does not furnish figures or details of these infusions) and his method of increasing the dead space of the respiratory tract is open to criticism because it is not accompanied by analysis of the lung and blood gases before and after.

[5] The conclusions on which this paper is based rest upon a hundred odd experiments performed on forty-six dogs. All the experiments were performed with the animal under profound morphine —Grehant (chloroform) or morphine ether anesthesia. We are deeply indebted to Dr. B. F. May for valuable assistance rendered during the summer of 1911 in a large series of experiments.

of sodium bicarbonate. There are three elements in the blood which split up the sodium bicarbonate molecule and set free carbon dioxide: (1) The hemoglobin; (2) the serum albumin; (3) the primary (acid) sodium phosphate. It will be seen therefore that the introduction of a solution of bicarbonate into the blood stream furnishes a direct and immediate increase of the carbon-dioxide content.

We may say at the outset that, without exception, every infusion of sodium bicarbonate caused a pronounced rise of blood pressure. In our first experiment, in which we introduced intravenously 200 c.c. of an 8.4 per cent. solution, the rise was so remarkably high, so long continued, and so notably in contrast with the efficiency of all the other antishock drugs and procedures that we had tried during the past five years that the practical therapeutical phase of the problem almost overshadowed the purely scientific inquiry regarding the influence of the carbon-dioxide content of the blood. A molecular solution of sodium bicarbonate was injected fifty times under varying conditions of blood pressure. An analysis of the results obtained from this set of experiments furnishes the following facts: (1) When 25 c.c. of the solution is injected into a normal (anesthetized) dog, with normal blood pressure, it occasions no rise of pressure and no perceptible increase of amplitude of beat. When, however, the injection is made into a dog reduced to a state of shock by manipulation and chilling of the abdominal viscera there is an immediate rise of pressure. Quantitatively this rise depends largely upon the age and general condition of the dog (old dogs respond much less vigorously than do young ones) and also upon the degree of shock. In moderate shock the rise is much more pronounced than in the later stages. We consider a rise of 18 mm. (mercury manometer) to be an average effect, but it was not uncommon for an injection to be followed by a rise of 40 mm. It was noted in analyzing our tracings that more significant than the sharp response to the injection is the steadiness with which the blood pressure climbs and maintains itself at a high level. We found in many instances that after the new level of pressure was established it required rough manipulation to reinduce the previous low level of shock pressure, and we believe that those dogs that received an initial injection of sodium bicarbonate before the abdomen was opened and while the pressure was at its normal height were reduced to a state of shock with more difficulty than those animals that did not receive an initial dose. Such a statement of course is difficult of proof because of the varying resistance of different animals to the various manipulations we practised.

Hand in hand with the rise of pressure went an increase of amplitude of heart beat. This increase varied quantitatively as did the rise of pressure itself, its chief characteristic being its constancy. Not infrequently the amplitude of beat was doubled

immediately after the injection of the bicarbonate, and the increased amplitude often persisted for half an hour or longer after the injection of the solution. We were fortunate in encountering one dog (experiment 16) that showed an abnormally large amplitude of beat before shock was induced. In this animal the amplitude of beat was 24 mm. In the state of shock the amplitude fell to 15 mm., but following the injection of 25 c.c. of a molecular solution of sodium bicarbonate the amplitude rose to 21 mm. Likewise in some animals very susceptible to manipulative procedures, with a normal low amplitude, in whom the cardiac weakness was so pronounced as to barely record any systolic-diastolic differences on the tracing the injection of the bicarbonate solution was immediately followed by an amplitude of beat measuring 3, 4, and 5 mm. This increase of amplitude, as we have pointed out in the case of the blood-pressure rise, is also well maintained over a fairly long period of time. One experiment (experiment 19) was particularly instructive in demonstrating the contrasting effects of sodium bicarbonate and adrenalin, one of the stock antishock drugs. The immediate effect of the first adrenalin (1 to 5000) injection was to raise the blood pressure without influencing the low amplitude of beat; following the injection without an appreciable time interval the blood pressure fell to a lower level than before the injection, and at this level it remained. A second injection of a stronger solution of adrenalin (1 to 1000) caused a more marked rise of pressure and a pronounced increase of amplitude lasting one minute, followed by a fall of pressure again to a lower level than before the injection and a diminution of amplitude to its previous small height of 1 mm. At this stage 50 c.c. of a molecular solution of sodium bicarbonate was injected and was followed by a well-sustained rise of pressure and by an increase in amplitude up to 4 mm.

In all of these fifty experiments with sodium bicarbonate we could not determine any effect on the rate of heart beat. When the bicarbonate was administered before shock was induced the rate of beat was not quickened, and when it was administered during the period of rapid heart action incidental to shock the rate was not slowed. These facts tally with the results of Howell[6] in his study of sodium carbonate.

In addition to its influence on the cardiovascular apparatus the sodium bicarbonate infusions exerted a marked effect on the respiratory function. The rate of respiration was sometimes increased, sometimes slowed, and sometimes unaffected. These variations did not seem to depend upon idiosyncrasies in the different dogs, for we observed all in the same dog following different injections of the same amount of the drug. The notable fact was

[6] Loc. cit.

that the depth of respiration was increased. This respiratory response which followed almost immediately upon the injection of the salt and persisted for a long period after the injection had been made was so pronounced as to attract attention by the marked thoracic movements and the deep sighing respirations. Graphic tracings were necessary merely as a matter of record. The explanation of the increased respiratory activity undoubtedly rests upon the influence of the excess of carbon dioxide upon the respiratory centre, for the respiratory phenomena observed after the injection of sodium bicarbonate were practically identical with those noted after the injection of pure carbon dioxide gas in later experiments. By using a marked excess of sodium bicarbonate solution the respirations could be made feeble and shallow, and for short periods even inhibited.

Such then were the effects noted upon the cardiovascular and respiratory mechanisms, following the injection of small quantities (25 c.c.) of a molecular sodium bicarbonate solution: marked increase of blood pressure, the increase following immediately upon the start of the injection and being well sustained for varying long periods; no influence upon rate of heart beat; marked increase of amplitude of beat, this increase likewise being well sustained over varying long periods of time; varying effects upon rate of respiration; constant effect upon depth of respiration, which was so increased as to be noticeable without the aid of tambour and drum.

It seemed to be evident after the first experiment that the pressor effect of sodium bicarbonate could hardly be explained on our *a priori* assumption that carbon dioxide was liberated intravascularly, thus replacing the gas lost as a result of shock (acapnia—Henderson). For, as we have already noted, coincidently with the rise of pressure following the injection of the bicarbonate there set in a period of marked and sometimes violent respiratory activity that induced a more thorough and prolonged ventilation of the lungs than we have ever seen caused by procedures planned to cause shock. If Henderson's theory of acapnia were correct such ventilation ought to have deepened the shock of our animals (25 c.c. of our solution contained 2.1 gm. of carbon dioxide gas, which could hardly be a sufficient quantity to make up any marked deficiency in the blood) on account of the marked increase in respiratory activity and resultant pulmonary ventilation. Since therefore the rise of blood pressure could not, with certainty, be explained on the basis of increased carbon dioxide content of the blood, we tried to determine what other factors might be discovered as possible explanations of the pressor effect of sodium bicarbonate. We attacked the problem by the process of exclusion and took up in order the influence of (1) the bulk of fluid injected; (2) hypertonicity of the fluid injected; (3) alkalinity of the fluid injected;

(4) influence of free carbon dioxide (intravascular) on the blood pressure.

Bulk of Fluid Injected. It is unquestionably true that the intravascular addition of any appreciable quantity of fluid to a shocked animal will cause a rise of pressure. This rise is usually transitory and the transitoriness usually measures directly to the degree of shock. In the marked grades of shock the fluid escapes into the tissues (edema) about as rapidly as it is introduced into the vessel, and therefore causes slight or no rise of pressure. In order to avoid any confusion of interpretation, such as might arise from mere bulk of fluid injected, we always introduced amounts under 26 c.c. We are therefore in a position to state that the rise of pressure following our injections was not due to mere bulk of fluid. In a number of experiments we noted a distinct rise after the introduction of from 2 to 5 c.c. of a normal solution of sodium bicarbonate. In this connection one series of experiments furnished particularly interesting results: A given quantity of sodium bicarbonate (2.5 grams) was injected into the shocked animals in dilutions of 1 to 10 and 1 to 40. The animals that received a 1 to 10 dilution (that is, 25 c.c.) showed the typical well-sustained rise already described, whereas those that received a 1 to 40 dilution (100 c.c.) showed a much more pronounced initial rise following the injection, with a tendency to sustain the high level. The greater rise caused by the more dilute solutions can be attributed only to the excess of fluid (75 c.c.) introduced, for in both instances the quantity of sodium bicarbonate was the same.

Influence of Hypertonicity. It has been demonstrated by numerous observers that in shock there is an escape of plasma from the bloodvessels into the tissues. This observation has been confirmed at autopsies and also by the determination of the specific gravity of the blood, which is heightened in shock as a result of concentration of the blood. It has even been suggested that shock is due to increased specific gravity of the blood. If the current of the stream of liquid from the vessels toward the tissues could be reversed, or even stopped, the specific gravity of the blood would not be raised. It is possible that the introduction of a hypertonic solution might accomplish this purpose and that our sodium bicarbonate infusions might have been effective on this basis. That this assumption is not correct, however, we proved by the simple experiment of infusing shocked dogs with the hypertonic salt solution and with hypertonic basic sodium phosphate solutions, with practically no effect on the low blood pressure. Dawson[7] working with hypertonic sodium bicarbonate solution secured results identical with ours.

[7] Loc. cit.

INFLUENCE OF ALKALINITY. It is so natural to assume that any phenomenon following the use of an alkaline salt is due to alkalinity that we must guard against a *post hoc* error in logic in explaining the pressor effect of sodium bicarbonate on the basis of its being an alkaline salt. In order to determine the influence of alkaline salts on the low blood pressure of shock, we infused various dogs with small quantities (25 to 50 c.c.) of 0.1 per cent., 0.25 per cent., and 1 per cent. of potassium hydrate in physiologic salt solution, with half molecular solutions of basic sodic phosphate ($Na_2H.P.O_4$), with half molecular solutions of sodium carbonate, and with molecular solutions of the alkaline tribasic sodic phosphate. These experiments showed conclusively that alkalinity alone cannot explain the rise in pressure. Sodium carbonate, for example, which is a much more strongly alkaline salt than is sodium bicarbonate, invariably gave a pronouncedly less marked rise of pressure. The basic sodic phosphate in most of our experiments gave no rise of pressure (this basic salt is in reality only slightly alkaline), and when a rise did occur following its use we were unable to determine positively that this rise was not coincidental rather than a casual result. The various solutions of sodic hydrate never caused a rise. The tribasic sodic phosphate, which is a strongly alkaline salt, caused only the slightest rise, and this rise was immediately followed by a fall that in two instances ushered in death.

On the evidence at our command, therefore, we are obliged to conclude that the pressor effect of sodium bicarbonate does no depend solely upon the alkalinity of this salt. This conclusion is important in its bearing on the possible relationship between shock and acidosis, recently emphasized by Henderson. The problem of neutralization of acid by alkali substances in the blood is far from being as simple a problem as it is *in vitro*, as the following experiment demonstrates. By the introduction into the circulation gradually of a normal solution of acid sodic phosphate (NaH_2Po_4) the pressure may be influenced just as it is by shock, that is, it falls. If not too much of the salt is introduced the pressure rises again spontaneously, just as it does in a shocked dog that has not been too much compromised. By repeated small injections the pressure may be made to reach a stage where spontaneous recovery does not occur and where to all intents and purposes (at least as far as manometric readings go) the animal is in a state of rather profound shock. The analogy between shock and acidosis seems on the face of it to be strong from this experiment. This analogy is further strengthened by the fact that the injection of a small amount of sodium bicarbonate immediately restores the blood pressure to a marked degree. Spiro[8] first out-

[8] Beit. z. lehre von d. Säurvergiftung bei Hunde und. Kananchen, Hofmeister Beit., 1902, Band i.

lined this experiment as an example of alkaline neutralization of an acid intoxication, and Jacoby[9] considers the experiment as an evidence of "entgiftung" or neutralization of poisonous acid salt by an alkali. We were able to confirm in detail the experiments of Spiro, but additional experiments performed by us did not point conclusively to the fact that the rise of pressure following the infusion of sodium bicarbonate was solely due to the alkalinity of this salt. For example, if acidosis were induced by infusing the acid sodic phosphate until a steady low blood pressure was reached the pressure could not be raised by instilling 0.25 to 1 per cent. solutions of sodic hydrate; the introduction of the basic sodic phosphate also had practically no effect, and the introduction of the tribasic sodic phosphate was followed by a rise of pressure not comparable either in degree or in duration to that secured by injecting sodic bicarbonate. Of course, this phase of the problem is fogged by the element of the toxicity of both sodic hydrate and the tribasic phosphate; but, nevertheless, we feel safe in assuming that in these acidosis experiments the pressor effect of sodic bicarbonate cannot unquestioningly be referred to its alkalinity alone.

At this point we were forced in spite of our fears of gas emboli to test out the possible blood pressure raising effect of carbon-dioxide gas supplied directly to the blood in shock. Our first experiment demonstrated that we could, with safety, introduce carbon-dioxide gas directly into the femoral vein from a Kipp generator. A detailed study of the physiologic effects of the intravascular injection of carbon dioxide will be made in a subsequent report. It will suffice here merely to say that by properly regulating the flow of gas we could administer it over an indefinite period of time, and that although the administration stimulated the respiratory function most actively it did not influence the rate of heart beat, amplitude of pulse pressure, or height of blood pressure. When the carbon-dioxide gas was administered before shock was instituted it had no influence in warding off the oncoming fall of pressure, and when administered during shock it likewise had no influence in restoring pressure toward a normal level. It would seem to be clearly established therefore both that the pressor effect of sodium bicarbonate does not reside in the carbon dioxide radical, and that shock itself cannot be referred to acapnia.

The direct vasomotor effect of the sodium bicarbonate solution upon the bloodvessels we have not tested out. Howell,[10] in his work upon sodium carbonate (a salt which, as we have seen, is closely allied to the bicarbonate in its action) says: "It is impossible from the experiments to state positively whether or not the

[9] M. Jacoby, Einführung in d. Exper. Therapie, Berlin, 1910, verlag Julius Springer.
[10] Loc. cit.

alkaline injections had any effect upon the tone of the peripheral arteries, but the impression that I have obtained from a study of the records is that they act solely as a stimulant upon the heart and that the increased arterial pressure was due chiefly if not entirely to a more vigorous heart beat."

Since none of the factors of bulk, hypertonicity, alkalinity, or free carbon-dioxide gas showed itself the sole cause of the pressor effect of sodium bicarbonate, we were forced by exclusion to assume that this salt acts specifically upon the heart muscle. This assumption receives corroboration from the fact that with both vagi cut, and even with all the higher cerebral centres destroyed by Jackson's[11] method, an injection of sodium bicarbonate is followed by a rise of blood pressure.

PINCHING THE APPENDIX IN THE DIAGNOSIS OF CHRONIC APPENDICITIS.

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Nothing in medicine in the way of examination seems to have been better learned than McBurney's point and its significance in connection with the diagnosis of appendicitis. It is rare indeed among the students of my postgraduate teaching experience to ask the question "What is McBurney's point?" and not receive an intelligent and capable answer. There is no doubt that the sign is of much value in the diagnosis of appendicitis, but that it fails at times is the purpose of this article.

In the average case of pain in the lower right quandrant of the abdomen, some rise in temperature, increase in the pulse rate, a spasm of the abdominal muscles over the area, and perhaps pain and tightening when the thigh is straightened on the pelvis, the diagnosis is easy. In these cases the area of tenderness upon pressure is so much larger than the area which corresponds to the appendix itself that pressure midway between the umbilicus and superior spine of the ileum in a backward direction serves the purpose. But there are frank cases, usually subacute or those with a small abscess, wherein the tenderness on pressure is lower than would correspond sharply to McBurney's point. In the average person when the head of the cecum is in normal position, an inch or so above the brim of the pelvis, the base or length of the appendix is slightly

[11] The Production of Experimental Cephalic Coma, Jour. Pharm. and Exper. Therapy, 1902, vol. iv, No. 1.

outside or midway on the spine and umbilical line, and there are many individuals in whom the cecum is much lower, and in them pressure upon what is McBurney's point may not elicit the tenderness that would come from pressure lower down over what would then correspond to the site of the appendix. This is particularly true in cases of chronic appendicitis where all that may be useful in the way of physical examination is a tenderness localized to the appendix. Not considering those cases that give a history of recurring acute attacks, there are many with dyspeptic symptoms due to a diseased appendix, this usually being a chronic process in which this sign may be important to diagnosis.

In this connection I desire to criticize the teaching of some of the surgeons that appendicular dyspepsia may exist, with no tenderness in the appendix region. It is always fair to the patient that no diagnosis of chronic appendicitis be made in those cases, even when the dyspepsia symptoms have subsided after the appendix had been removed, because it may be that the patient had fears of the appendix being the cause of the dyspepsia and the removal of it acted autosuggestively in a favorable way upon the dyspeptic symptoms. I believe that an appendix must be tender before it can be of significance in causing dyspeptic symptoms.

In the diagnosis of chronic appendicitis we must take into consideration the conditions of Lane's kink, Jackson's, and firmer membranes of the cecum, together with some less well-known conditions, such as insufficiency of the ileocecal valve, chronic excessive intestinal putrefaction causing a tender cecum, mainly at its head, and states connected with the ovary or extracecal structures.

Taking cases with a history of chronic disorder in which more or less distress exists in the right iliac fossa, diagnosis of the above-mentioned states can only be made as follows: Lane's kink by radiographs taken when the bismuth has reached the ileocecal region, these being made with the patient lying on the left or right side and preferably in Trendelenburg's position. The same is true of Jackson's and firmer membranes of the cecum wherein the mobility of the cecum can be studied by the *x*-rays and the presence of a membrane suspected. In addition to that a careful study of the bacteriology of stools with reference to their anaërobic content suggests the cause of membrane formation, for Jackson's membrane is a protective process in which the endothelium of the peritoneum is raised by a hyaline subendothelial substance, vascularity of the membrane taking place as a nutritive process. Further, the double-barrelled colon is usually accompanied by these membranes.

Insufficiency of the ileocecal valve can only be diagnosticated by the *x*-rays, with a fluid bismuth suspension being introduced per rectum. The tender cecum due to chronic excessive intestinal

putrefaction is diagnosticated by a careful study of the stools and urine. This means the establishment of the patient on a known diet and the recording of the quality and quantity of foods for several days. Then careful and complete analyses of a twenty-four hour collection of urine and specimens of stool must be made, carrying the first through the sulphate partition, estimating the oxalic and uric acids, and so forth, and the second through the fermentation and putrefaction tests, as well as through the products that such feces manufacture during these tests, with a careful study of the bacteriology.

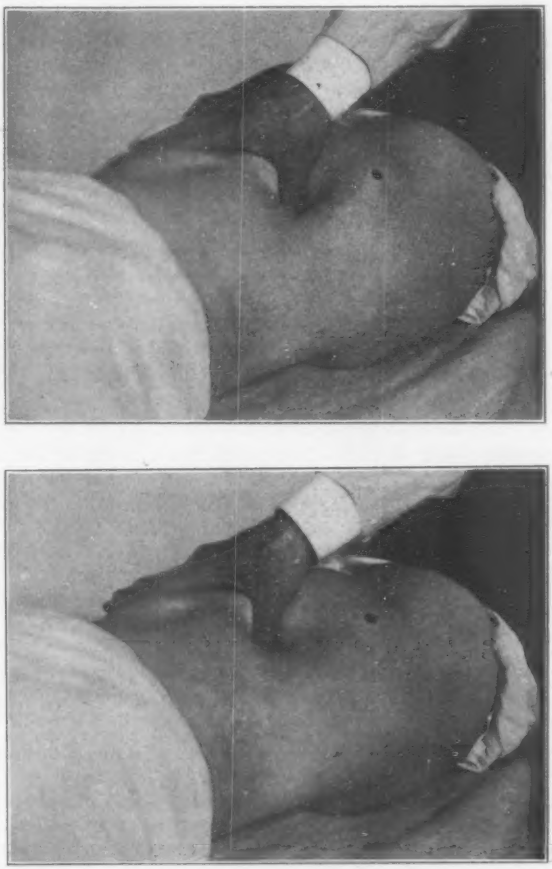
Conditions of the right ovary can usually be excluded by bimanual palpation, provided one is careful in palpating the ovary between the fingers, causing it to slip about on the end of the internal finger. Inflamed or diseased ovaries are tender upon pressure. After the tenderness of the ovary has been elicited the external hand makes pressure at right angles away from the ovary to the lateral wall of the pelvis and in a backward direction toward the appendix. In a simple case it will then be noted that no tenderness exists beyond the ovary.

As was stated before, the appendix may occupy any position from the line drawn from the umbilicus to the anterior superior spine downward to the brim of the pelvis. It is logical that pressure upon McBurney's point in an appendix that is chronically diseased and located below it will not elicit the tenderness that pressure below the point would, and if the subject be a female, one is liable to make the mistake and think that the right ovary is at fault. For the purpose of helping to differentiate this on abdominal examination alone a little extra consideration is required.

Covering the majority of cases met with clinically and in thin subjects a point midway between the anterior superior spine and the umbilicus falls inside of the right edge of the rectus on that side. In the general run of cadavera if a long needle is driven down from this point and then dissection made it will be found that its course corresponds to inside the cecum, considering the cecum on a curved vertical line. In some, in the prone position it is directly over the cecum. Now in these when one makes pressure directly backward, as is done in obtaining McBurney's tenderness, one is liable to press inside of the cecum or upon it and not over the appendix. In a number of appendices that I have had removed I have found the following plan to be decidedly more successful.

If the patient is not too stout the lower border of the cecum is percussed for from Poupart's ligament upward. Fortunately the cecum is usually distended with gas and an accurate level of the cecum when the patient is on the back can be determined. After this is noted, percussion transversely across the cecum is made to obtain its outer and inner edge. The outer edge is always possible of being noted. In percussing for this it is necessary when

on the outer edge that the percussion stroke be directed straight backward toward the lateral edge of the body, and when on the inner, directly backward toward the junction of the psoas and



Pinching the Appendix. First shows pressure on a line midway between the umbilicus and the anterior superior spine of the ileum on the right side, the latter marked with a black dot. The second, the swinging of the thumb to the right of the patient, and pinching the appendix against the iliacus muscle. Patient viewed down the right side, head to the left of photograph.

iliacus muscles at that area—these lines being more oblique than the outer edge of the rectus. With an estimation of about where the appendix would be as judged from the location of the lower end and sides of the cecum, pressure on the abdomen should be

made at that point. When the cecum cannot be mapped out by percussion or the subject is well developed, and even in all, the second plan is to note the position of the right edge of the rectus muscle on the umbilical-spine line maintaining the site with a finger. Having the patient rise to a sitting position helps in palpating for the rectus edge. Standing at the right and facing the patient (for right-handed individuals) the thumb is placed vertical on the abdomen, the tip of the thumb pointing to the ensiform, when it is slowly pressed backward into the abdomen, not inward, outward, up or down. When the thumb has been sunk about half-way down to the back of the abdominal cavity, it is swung to the right of the patient at a right angle to the downward pressure line. This pinches the appendix against the iliacus muscle and unyielding structures under and at the side of it, and usually elicits pain or tenderness. It is well, having done this in the mid-distance between the anterior superior spine and the umbilicus and not having obtained tenderness, to move the thumb down about one-half inch, performing it again, and so on downward until one has reached almost to the brim of the pelvis. The same procedure on the left side serves as a control. By means of this method of downward and then right lateral pressure it is possible to elicit tenderness in the average case of chronic appendicitis. When tenderness is obtained on transverse pressure to the left it may be a Lane's kink, and when below it may be a tender ovary instead of an appendix.

THE EFFECTS OF CONTINUOUS ADMINISTRATION OF EXTRACT OF THE PITUITARY GLAND.

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The present investigation was undertaken in order to study more particularly the effect of pituitary extract upon the blood pressure when administered by the mouth over a more or less prolonged period, but also, at the same time, to observe other phenomena which might be attributed to the employment of the drug.

The effect of intravenous or hypodermic injections of preparations of the pituitary gland upon the blood pressure has been studied by numerous observers, and the gland has been given by mouth for long periods in the treatment of infantilism; but in the first case the observations were only taken for a comparatively short time, and usually after one large or several frequently repeated doses, and in the latter case no systematic studies have been made

of the effect of the prolonged use of the gland upon the blood pressure.

Various observers have shown that injections of extract of the infundibular portion of the pituitary gland cause a rapid and pronounced rise in blood pressure, which persists for a variable time, usually much longer than that produced by adrenalin, and which is due to the constriction of the peripheral arteries. Repeated injections, however, result in a less marked rise in the blood pressure after each injection until finally a fall in pressure occurs. Various theories might be employed to explain this fall:

1. That it is due to a saturation of the blood, with pituitary extract, "so that an interaction takes place which converts its constricting action on the peripheral vessels into a dilating one."[1]

2. That it is due to a late depressing action influencing the strength of the cardiac beat.[2]

3. That it is due to the action of the depressor substance which the gland contains overpowering the pressor substance, causing a dilatation of the peripheral bloodvessels.[3]

4. That it is due to the central dilator effect of the drug.[4]

5. That there is an inhibitory substance present, preventing a secondary action of the drug.[5]

Of these theories the first and second seem most tenable. It is therefore plausible to attribute the secondary depressor effect of the drug to the larger quantity that is necessary to produce this result. Similar effects are noted with some other drugs which in average dose will produce certain result, while larger, not necessarily lethal doses, will cause a result contrary to the initial finding. In giving fair-sized doses of the glandular extracts by the mouth the overwhelming action of the larger doses is thus obviated and the effects are largely those that result from its primary action. Aside from the action of the infundibular portion of the gland upon the vascular system, several other effects may be observed; thus it has been noted that persistent use of lager doses may cause glycosuria; after single and repeated intravenous injections diuresis occurs; frequently there is a slowing of the pulse rate, perhaps associated with a decrease in the amplitude of cardiac contractions; possibly an inhibition of the flow of pancreatic juice; and usually stimulation of the uterine and intestinal musculature. Clinically, the infundibular portion of the pituitary gland has been extensively employed as an oxytoxic, occasionally as a diuretic. It has given

[1] C. P. McCord, An Investigation of the Depressor Action of Pituitary Extracts, Arch. Int. Med., 1911, viii, 609.

[2] C. J. Wiggers, The Physiology of the Pituitary Gland and the Actions of its Extracts, Amer. Jour. Med. Sci., 1911, cxli, 502.

[3] Schafer and Vincent, The Physiological Effects of the Pituitary Body, Jour. Phys., 1899–1900, xxv, 87.

[4] T. Sollman, and J. I. Pilcher, Central Vasomotor Effects, Jour. Pharm. Exp. Therap., 1910, i, 571.

[5] W. W. Hamburger, The Action of Intravenous Injections of Glandular Extracts and other Substances upon the Blood Pressure, Amer. Jour. Phys., 1904, xi, 282.

good results as a vasoconstrictor when employed in the treatment of shock and other conditions associated with transient low blood pressure. It has also been used in many other less relevant conditions. Extracts of the whole gland have been used in the treatment of both acromegaly and infantilism.

In the following series of patients the first few were selected for observation because they had showed persistent low blood pressure upon repeated examination; later, patients showing higher pressures were also given the glandular extract. In all, observations were made upon 18 people, 13 of whom were patients in the dispensary of the Hospital of the University of Pennsylvania, and 5 of whom were medical students who volunteered to assist in the investigation. The extract was given over a period of from one week to ten months without other medication. The 5 students took the extract for only a week, but it was administered to all the patients for at least a month unless stopped on account of some untoward effect. The preparation employed was the extract of the whole gland made up in 0.2 gram tablets containing 0.065 gram of the dried gland, equivalent to 0.26 gram of the fresh gland. The dosage at first was two of these tablets twice a day, but no effect was noted until the dose was increased to one tablet four times a day. Larger doses were given to several individuals, but soon discontined.

Although most observers have agreed that the posterior lobe or infundibular portion of the gland elaborates the secretion that acts upon the bloodvessels, nevertheless in a recent work, D. Lewis, J. L. Miller, and S. A. Matthews[6] found that extracts of the pars intermedia caused a decided rise in blood pressure, the extracts of the pars nervosa also caused an eventual rise in the pressure, as did likewise in the majority of instances, extracts of the anterior lobe. They believe that the pressor substance is secreted by the pars intermedia and those cells of the anterior lobe which bound the cleft. It therefore seemed feasible to employ the whole gland not only because of the impossibility of securing preparations containing only the pars intermedia, but also because the dried extract is more suitable to prescribe to dispensary patients.

The blood pressure was taken one or more times before giving the pituitary tablets, and then later at each subsequent visit to the dispensary until the observations were discontinued. The blood-pressure readings were all taken two or more hours after ingestion of the glandular extract and after half-hour or more rest in the dispensary. The readings were made by the auscultatory method, systolic and diastolic pressure being recorded while using a Stanton sphygmomanometer.

PATIENT 1.—The glandular extract caused a rise in pressure from 12 to 20 mm. of mercury in all the many observations. The

[6] The Effects on Blood Pressure of Intravenous Injections of Extracts of the Various Anatomic Components of the Hypophysis, Arch. Int. Med., 1911, vii, 785.

pulse pressure showed but little variation. The pulse rate averaged consistently about 80 beats per minute, except at one time when it fell to 60, after taking larger doses, six tablets a day, for several days. This larger amount also caused diarrhea. Twelve days after cessation of treatment, pressure showed but slight change, in nineteen days it had returned to its former level.

PATIENT 2.—The systolic pressure increased 18 mm. of mercury. The diastolic pressure was unchanged. Diuresis was observed.

PATIENT 3.—The systolic pressure was increased from 9 to 20 mm. at different observations. The pulse pressure was unchanged. A slowing of the pulse rate—60 per minute—was also noted for a short time. At one time during the experiment the patient stopped the drug for six days without any effect on the blood pressure. Eight days after the complete cessation of ingestion of the glandular extract the systolic pressure had returned to within 8 mm. of mercury of the average pressure before the experiment, and in thirteen days had fallen back to the previous average pressure.

PATIENT 4.—The systolic pressure increased 8 to 10 mm. at various observations. The pulse pressure remained unchanged.

PATIENT 5. The increase of systolic pressure varied between 12 and 18 mm. The pulse pressure was unchanged, and the pulse rate was variable.

PATIENT 6.—The increase in systolic pressure varied between 13 and 20 mm. The pulse pressure before taking the gland was 35; during its administration it was between 45 and 65, and the pulse rate averaged 86.

PATIENT 7.—The systolic pressure increase averaged 16 mm. The pulse pressure was unchanged. Diarrhea developed after taking the gland extract for two weeks, and it was therefore discontinued.

PATIENT 8.—This patient suffering with chronic nephritis and low blood pressure was one of the few patients decidedly improved by the action of the gland. The systolic pressure estimated several times before taking the preparation never exceeded 105 mm. of mercury. It rose a short time after the use of the extract to 112; two days later it rose to 120, and henceforth varied between 120 and 125. The diastolic pressure rose synchronously with the systolic. The secretion of urine was decidedly increased, according to the report of the patient, and the subjective symptoms were also markedly alleviated, so that he felt better than at any time during the past several years. The pulse rate also showed an increase, rising from 64 to 92 beats per minute. One week after discontinuation of the drug the pressure was 115 and in two weeks back to 105.

PATIENT 9.—This patient, with a more elevated pressure than the majority of the individuals studied, showed in nine days an increase in pressure equal to 27 mm. of mercury, the pressure

rising to 155 systolic and 90 diastolic. The pulse rate increased to 106. The pituitary extract was immediately stopped.

PATIENT 10.—This patient showed an increase of systolic pressure of 20 mm., but as a severe diarrhea developed the treatment was discontinued.

PATIENT 11.—The systolic pressure was increased, the increase ranging between 12 and 20 mm. of mercury. The pulse pressure ratio remained unchanged. Two weeks after cessation of the drug the systolic pressure had returned to previous figures.

PATIENT 12.—The increase of systolic pressure varied between 15 and 20 mm. of mercury. The diastolic pressure did not show a corresponding increase. The pulse rate was also increased, averaging about 95 beats per minute. Two days after stopping the drug the systolic pressure was down 5 mm. In twelve days it was 5 mm. higher than before starting the experiement. Eighteen days it was approximately at the same level as at the beginning of the drug treatment.

PATIENT 13.—The blood pressure increased from 123 systolic (70 diastolic) to 135 systolic (80 diastolic) in twelve days, when the treatment was stopped on account of diarrhea. The pulse rate increased 15 beats per minute.

Subsequent observations after discontinuation of pituitary extract in these patients showed a tendency for the pressure to return to its previous level after a lapse of about two weeks. This fall occurred gradually so far as could be determined.

Five students took the glandular extract for a week. Four showed a rise in systolic pressure of 4, 10, 15 and 17 mm. of mercury respectively without a corresponding rise in diastolic pressure. One showed no change in the systolic or diastolic pressure. In two of these men no change in the pulse rate occurred, while in the other three there was an increase of 10, 10, and 20 beats per minute. Three noted diuresis; the two that did not note this effect had a rise of 4 and 17 mm. respectively. One man had a slight diarrhea, while 2 had a severe diarrhea, which was worse in the man whose pressure went up the most. Examinations of the urine of the 18 patients were made, and at no time was sugar demonstrated by Fehling's test.

RECAPITULATION. Eighteen individuals were given the dried extract of the whole pituitary gland without other medication. The following effects were noted:

1. Blood pressure: Seventeen showed a rise in systolic blood pressure, the greatest rise being 28 mm. of mercury. Usually a corresponding rise in diastolic pressure occurred, though rarely it remained at the same height as before taking the extract or even became lower.

2. Pulse rate: The changes in the pulse rate were inconstant; an increase was generally observed, though in 2 individuals the rate was decidedly decreased.

3. Diuresis: Six individuals noted a diuretic effect. The extent, absence, or presence of this symptom could not be accurately determined. The urine showed no particular change except in one case (8). Glycosuria was never observed.

4. Intestinal tract: Diarrhea developed in 7 cases, and 4, previously costive, had daily movements during the period of taking the drug.

5. Subjective symptoms: Four individuals were apparently much benefited by the rise in pressure and general stimulative effect of the glandular extract upon the unstriated muscle, and one person was benefited through the diuretic effect of the extract. In the remaining patients there was little effect noted except by those who developed the rather annoying diarrhea.

CONCLUSION. Prolonged administration of extracts of the pituitary gland exert a distinct pressor effect upon the peripheral vascular apparatus, which persists for an appreciable time after discontinuation of the drug. This is apparently the only consistent affect following continued administration of the gland *per oram;* other results are variable and indefinite.

TUBERCULIN THERAPY IN SURGICAL TUBERCULOSIS, WITH THE CORRECT DOSAGE ACCURATELY DETERMINED BY THE CUTANEOUS REACTION.

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IN 1910 White and Van Norman[1] reported a method of determining, by means of a cutaneous reaction, the correct therapeutic dosage of tuberculin for subcutaneous injection. The method was adopted in the surgical and gynecological wards of St. Francis Hospital, Pittsburgh, and has been followed in the treatment of twenty-eight cases of surgical tuberculosis. A more recent article[2] by the same writers confirms their previous work.

Starting with the theory that much of the benefit derived from tuberculin therapy is due to the reaction on the part of the body cells produced by tuberculin rather than to an induced tolerance to it, the method is based on the variation in susceptibility of different individuals to the action of tuberculin on the skin and when injected into the tissues. The optimum dose, as determined by this method, is the quantity of tuberculin required to produce the greatest local, general, and focal reaction without producing consitutional symptoms, such as rise of temperature, malaise, and other evidences of overdosage.

The dose for each individual is determined according to that

[1] Arch. Int. Med., 1910, vi, 449. [2] Ibid., 1912, ix, 114.

individual's susceptibility to tuberculin as shown by the cutaneous reaction, and treatment is begun with this optimum dose instead of starting with a very small arbitrary quantity of tuberculin and gradually increasing the dosage in order to produce a tolerance, as is commonly done in the various methods of tuberculin therapy in vogue today. By the new method the treatment is begun with larger quantities of tuberculin, a longer interval is allowed to elapse between doses, and no effort is made to produce a tolerance. In this way treatment may be continued for months without necessity for changing the dosage.

In our cases tuberculin was used as an adjunct to the usual hygienic and dietetic measures such as rest, fresh air, sunshine, and nourishing food. Sinuses were treated locally, with tincture of iodine or with injections of Bismuth paste. In cases with joint involvement, fixation and extension were employed. Operative treatment was conducted when thought to be indicated, and tuberculin was used after incomplete removal of diseased tissues. In children, operative procedures were limited as much as possible, and consisted chiefly of incision or aspiration of abscesses, and curettement of sinuses. The majority of the cases of tuberculous adenitis in children presented sinuses or broken-down fluctuating glands, which were incised. These patients were treated with tuberculin without removal of the glands. As a rule, tuberculin was not given in cases with temperature above 100°. The hospital patients were treated outdoors, and confined to bed during the febrile period of the disease. Many of the afebrile cases were treated in the out-patient department, with instructions as to their mode of life at home.

The cases were treated until all symptoms disappeared and they were apparently well. An effort was made to continue with the administration of tuberculin for months after there was apparent cure, and this was done in a few of the cases; but in the majority of instances the patients failed to return for further treatment after the disappearance of signs and symptoms.

The diagnosis of the cases was based on the clinical history, physical examination, tuberculin test, *x*-ray pictures, negative bacteriologic findings in cases with pus which had not been exposed to secondary infection by the spontaneous rupture of the abscess, and was confirmed in a large proportion of the cases by microscopic examination of the tissues removed. The Wassermann reaction was used in some of the cases to aid in excluding syphilis, especially in those cases showing multiple bone lesions.

TECHNIQUE. White and Van Norman[3] showed that the quantity of tuberculin required to produce a reaction of 4 mm. on the skin, their so-called "minimal cutaneous reaction," will, when injected intradermically, produce a local reaction at the site of injection 2 to 5 cm. in diameter. They consider this quantity to be the

[3] Loc. cit.

optimum dose—that is, the dose that will produce the most marked reaction without producing constitutional symptoms. For determining this dose the technique employed in this series has been practically that advocated by the originators of the method, with a few minor exceptions.

The tuberculin used was Koch's O. T., in various dilutions. In addition to this a von Pirquet scarifier, a pipet which measures $\frac{1}{100}$ c.c. of the tuberculin dilution, and shields for the protection of the site of the skin test were used. For the latter purpose lids of pill boxes, secured in place by strips of adhesive plaster, were found to be sufficient.

On the mesial anterior surface of the forearm the skin is cleansed with ether, and two points, about one inch apart, are scarified by a rotary motion of the scarifier until sufficient epidermis is removed to leave a pink base from which neither blood nor serum exudes.

These scarified areas measure 2 mm. in diameter. The lower area is used as a control, while on the upper area there is placed $\frac{1}{100}$ c.c. of the tuberculin dilution, the shield is applied and the patient is instructed to hold the arm horizontally until the solution dries, which requires twenty to thirty minutes as a rule. The shield is worn until the first reading is made. The readings are made in twenty-four, forty-eight, and seventy-two hours after the tuberculin is applied, and the area of redness and swelling is measured in millimeters.

Since many of the minimal cutaneous reactions (4 mm. in diameter) occur with dilutions near 1 per cent. this dilution serves as a good working basis with which to begin, and thereafter weaker or stronger solutions can be used according to the size of the reaction obtained. For example, if $\frac{1}{100}$ c.c. of 1 per cent. tuberculin produces a reaction 6 mm. in diameter in forty-eight or seventy-two hours, weaker solutions as $\frac{1}{2}$ per cent. or $\frac{1}{4}$ per cent. should be used until a 4 mm. reaction is obtained. The quantity of tuberculin in $\frac{1}{100}$ c.c. of the dilution used to produce the 4 mm. reaction, which quantity, in the case of 1 per cent. tuberculin, would be $\frac{1}{10000}$ gm., or $\frac{1}{10}$ mg., is the optimum dose. This quantity, when injected into the skin, should produce a local reaction 2 cm. to 5 cm. in diameter at the site of the injection, which local reaction serves as a control of the test.

The therapeutic injections were given into the arm every two weeks. No effort was made to inject the tuberculin with reference to the lymphatics in the region of the tuberculous focus, as suggested by White and Van Norman.

Remarks on Technique.—Until one becomes accustomed to reading the skin reactions it is well, after first obtaining the 4 mm. reaction, to repeat the test with a weaker solution. For example, if a 4 mm. reaction is obtained with 1 per cent. solution the test should be repeated with $\frac{1}{2}$ per cent. solution, and if the previous reading was correct the size of this last reaction should be less than

4 mm. in diameter. White and Van Norman advise waiting three or 4 days between each skin test, and one week after the last skin test before injecting the therapeutic dose. We have, up to the present time, experienced no untoward results with the method, although we have repeated the tests as soon as the readings were made, thus shortening the time required for estimating the optimum dose. Two or three tests are usually sufficient.

Our dilution for therapeutic injections were made so that $\frac{1}{2}$ c.c. contained the desired quantity of tuberculin, thus making a constant bulk of solution for injection in every case.

As the injection into the skin is more painful than into the subcutaneous tissues we have been injecting only the initial dose into the skin. This is done in order to determine the size of the local reaction, which we use as a control of the skin test. The subsequent injections of tuberculin were made into the subcutaneous tissues, except that every two or three months we injected again into the skin to note whether the size of the local reaction had changed, thus determining whether it was necessary to repeat the skin test and estimate a new dose. We have not found it necessary to change the dosage in any of our cases which were treated uninterruptedly. Although some of them were treated over a period of months the local reaction at the site of injection did not vary in this beyond the limits of 2 cm. and 5 cm.

That susceptibility to tuberculin does change was shown in our cases of tuberculous peritonitis, especially when rapid and marked improvement took place after operation. While these cases responded mildly to the von Pirquet test before operation, their rapid improvement after operation was accompanied by a marked increase in the intensity of the reaction to the test. If the dose of tuberculin had been estimated and injected before operation we are unable to say whether this change in susceptibility after improvement took place would have necessitated a change in dosage, as treatment was begun in our cases after operation and not until the patient's temperature had fallen to below 100°, and the general condition was much improved as a result of operation.

For measuring $\frac{1}{100}$ c.c. we use a capillary pipette. One one-hundredth gram of distilled water is weighed on a chemical balance; this quantity of fluid readily passes up the tube by capillary attraction and the upper level is marked. A rubber tube, such as is used on a blood pipette, is attached to the capillary pipette, and with this the tuberculin can be accurately transferred to the scarified area.

The dilutions of tuberculin are made on the basis that 1 c.c. of Koch's O. T. contains 1000 mg., or 100 per cent. of tuberculin. From this, weaker solutions are made with normal salt solution containing 0.25 per cent. phenol. Fresh solutions are made up every two months, and are kept on ice. We keep the following dilutions for the skin test, viz: 10 per cent., 1 per cent., and 0.1 per

cent., and from these 3 per cent. or 0.5 per cent. or any required dilution for the skin test can be made. The solutions for therapeutic injection are made so that ½ c.c. contains the desired quantity of tuberculin. For example:

(*a*) 1 c.c. of 0.1 per cent. solution plus 9 c.c. diluent—½ c.c. contains 0.00005 gm. of tuberculin.

(*b*) 1 c.c. of (*a*) plus 9 c.c. diluent—½ c.c. contains 0.000005 gm.

(*c*) 2 c.c. of 0.1 per cent. solution plus 9 c.c. diluent—½ c.c. contains 0.0001 gm.

(*d*) 1 c.c. of (*c*) plus 9 c.c. diluent—½ c.c. contains 0.00001 gm.

In this way any dilution can be readily made.

RESULTS.—There were twenty-eight cases treated in this series, consisting of tuberculosis of the kidney and ureter, peritoneum, bones, joints, glands, and skin, as follows:

Case No.	Age.	Tuberculosis of	Operation.	Dose, grams.	Duration of treatment.	Results.
1	29	Kidney and ureter	1. Incision of abscess 2. Nephrectomy	.000005	9 months	Well.
18	20	Peritoneum	Laparotomy; double salpingectomy	.0005	3 months	Improved.
4	46	Peritoneum and pleura	1. Thoracentesis; paracentesis 2. Laparotomy; appendectomy	.0001	1 month	Well.
16	3	Inguinal glands	None	.00001	3½ months	Well.
23	16	Axillary glands	None	.00002	2 months	Improved. Under treatment now.
19	4	Cervical glands	None	.00005	3 months	Improved.
20	23	Cervical glands	None	.0001	3½ months	Improved.
26	16	Cervical glands	None	.00001	1 month	Under treatment.
27	3	Cervical glands	None	.00002	2 weeks	Under treatment.
9	26	Cervical glands	Incision of abscess	.00005	2½ months	Improved.
12	17	Cervical glands	Excision of glands (incomplete)	.00001	3 months	Well.
13	18	Cervical glands	Excision of glands (incomplete)	.000005	2 months	Improved under treatment.
22	29	Cervical glands and lungs	None	.0001	3 weeks	Unimproved.
15	2	Cervical glands and hip	Aspiration of abscess—hip	.000005	2 months	Well.
28	4	Cervical and inguinal glands	Incision of abscess—neck	.00002	2 weeks	Under treatment.
10	7	Cervical glands and bones (multiple)	Incision of abscess—neck and curetment of bone sinuses	.00001	3 months	Improved under treatment.
11	2½	Bones (multiple)	Curetment of sinuses	.000005	2 months	Improved under treatment.
14	7	Bones (multiple)	Curetment of sinuses	.00001	3½ months	Improved.
6	35	Bones (vertebræ)	Laminectomy	.00005	7½ months	Dead.
3	16	Hip	None	.00015	1½ months	Well.
25	10	Hip	None	.00005	2 months	Improved under treatment.
5	42	Hip	Incision of abscess	.00005	5 months	Well.
8	6	Hip	Aspiration of abscess	.00005	2½ months	Well.
24	2	Knee	None	.00005	2 weeks	Unimproved.
2	39	Ankle	Arthrotomy and curetment	.00005	1 month	Improved.
7	5	Ankle	None	.00001	8½ months	Well.
17	30	Elbow	Resection of joint	.00005	1½ months	Well.
21	16	Skin	None	.00001	5 months	Well.

Ten of these were aged above and 18 below twenty years, 11 of the latter being under ten years and the remaining 7 between sixteen and twenty years. The dosage of tuberculin in this series varied from $\frac{1}{2000}$ mg. to $\frac{1}{2}$ mg., showing a variation in susceptibility of a hundred fold.

In the 10 cases above twenty years of age the dosage varied from $\frac{1}{20}$ to $\frac{1}{10}$ mg. in 8 of them. In 1 case it was $\frac{1}{2000}$ mg., and in the other it was $\frac{1}{2}$ mg., which was the largest estimated dose in the series. This patient was aged twenty years.

Of the cases below twenty years the dosage was $\frac{1}{2000}$ mg. in 3, $\frac{1}{1000}$ mg. in 7, $\frac{1}{50}$ mg. in 3, $\frac{1}{20}$ mg. in 4, and $\frac{3}{20}$ mg. in 1.

In a general way the dosage below twenty years of age was near $\frac{1}{1000}$ mg., while above twenty years of age it was near $\frac{1}{15}$ mg. This emphasizes the increased susceptibility to tuberculin of younger individuals. On the other hand the variations and exceptions, as in the case of the one patient above twenty years of age, for whom the dose was $\frac{1}{2000}$ mg., shows the value of a method whereby the dosage is determined according to the individual susceptibility of the patient to tuberculin.

The longest time during which any one patient was treated was nine months. 3 patients were treated for periods extending over seven months. In none of these was it necessary to change the dosage as originally determined by the skin test. There was noted from time to time a variation in the size of reaction produced at the site of injection, but this variation was between 2 cm. and 5 cm., which are the arbitrary limits of the size of reaction that should be obtained at the place of injection.

In 3 cases (10, 11, and 13) who stopped treatment before they were discharged, and who later returned for further treatment after intervals of nine to eleven months, it is interesting to note that the dosage remained the same.

The method of determining the dose has been found reliable in all cases. Constitutional symptoms were obtained in 1 case (11), but through no fault of the method. In this case a reaction of 6 mm. was obtained with $\frac{1}{50}$ mg. of tuberculin on the skin. As there was not sufficient time to do another test before the next regular day for therapeutic injections, $\frac{1}{1000}$ mg. was assumed to be the quantity that would produce a 4 mm. reaction. The injection of this quantity was followed by constitutional symptoms. Later, $\frac{1}{2000}$ mg. was found to be the correct dose as determined by the skin test, and was given without producing constitutional symptoms.

Of the 28 cases, 11 are considered as well, 11 improved, 5 unimproved, and 1 dead. As will be seen farther on, the 5 unimproved cases were treated for too short a time to be considered in estimating the value of the method from the standpoint of end results. Of the 11 cases discharged as well, 7 returned recently for examination and have remained well as follows:

Case 1, twelve months after discharge.
Case 3, nineteen months after discharge.
Case 4, twenty months after discharge.
Case 5, sixteen months after discharge.
Case 7, eight months after discharge.
Case 16, three and a half months after discharge.
Case 21, one and a half months after discharge.

The remaning 4 were discharged as well, and have not been heard from since then.

One of the chief difficulties experienced has been to get the patients to return for treatment after the visible lesions have healed. Cases with a sinus, as in cervical adenitis, were treated until the sinus healed, when frequently the patient would fail to return for further treatment, although other enlarged glands might be present. These cases have been designated as improved.

Of the 11 cases improved, 2 (9 and 19) were cases of cervical adenitis, with sinuses, who, after the sinuses were healed, failed to return for treatment, and have not been heard from since. Two cases (10 and 13) of cervical adenitis who discontinued the treatment after the sinuses were closed, returned later with recurrence, and are at present under treatment. One case (20), with enlarged glands of neck without sinus, failed to return after the tenderness had disappeared. One case (23) had involvement of the axillary glands, with sinus. The sinus is now healed and the patient is still under treatment. Case 25, with tuberculosis of the hip, is apparently well and is still under treatment. Four cases (2, 11, 14, and 18) have discharging sinuses which were definitely improved, but for various reasons these patients did not continue treatment. Two of them have not been heard from, and another (11) returned later and is at present under treatment. The other was almost healed when he left, and has written recently that the sinuses are healed.

Of the cases marked as unimproved, 1 (25) received one injection, and 1 (22) received two injections and did not return for further treatment. 2 (27 and 28) have received one injection and 1 (26) received two injections, and are still under treatment. These cases are reported not for the final results, but because the dosage was determined by the method described above.

The 1 case (6) with Pott's disease which died, showed marked improvement symptomatically and in his general condition for two months, when he suddenly developed paraplegia and died eight months later. With this one exception all cases treated have been cured or improved, as the cases marked unimproved were treated for too short a time to be considered in the end results.

Many of the cases with sinuses which previously had been treated for months without improvement showed rapid improvement after the tuberculin injections were begun. This happened frequently

enough to be more than a coincidence, and we believe, from our experience with this series of cases that tuberculin in doses determined by this method is a valuable aid in the treatment of surgical tuberculosis.

CONCLUSIONS.—1. The variation in susceptibility of different individuals to the action of tuberculin is marked.

2. The correct therapeutic dose of tuberculin for any individual can be determined accurately by the cutaneous reaction.

3. Tuberculin therapy by this method is a valuable aid in the treatment of surgical tuberculosis.

The writer desires to express his gratitude to Drs. R. T. Miller, Jr., and R. R. Huggins, in whose services these cases were treated, for the privilege of reporting the same, and to Drs. White and Van Norman, of the Tuberculosis League of Pittsburg, for their valuable suggestions and aid.

NOTE.—Since this paper was written the dose has been determined by the above method and given without producing constitutional symptoms in two cases, viz., tuberculosis of the cervical glands and tuberculosis of the hip, making a total of 30 cases.

THE INFLUENCE ON GASTRIC SECRETION OF ASEPTIC FOREIGN BODIES IN THE GALL-BLADDER.

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THESE experiments were undertaken in the hope of finding some explanation for the gastric hyperacidity so frequently found clinically in association with cholelithiasis. As originally planned they formed part of an extensive series dealing with this subject, but before the work was completed, Lichty's[1] work on the same subject and covering the same ground appeared, thus rendering unnecessary their further prosecution. It seems worth while, however, to report the results obtained in the first simple phase of the investigation, partly because they are not in general in accord with those of Lichty and partly because they control possible sources of error in his work. These are the use of the stomach-tube in feeding the animals, the administration of food at irregular intervals, and the brief postoperative period of observation.

[1] The Relation of Disease of the Gall-bladder and Biliary Ducts to the Gastric Functions, AMER. JOUR. MED. SCI., January, 1911, vol. cxli, No. 1.

Lichty's conclusions are briefly as follow: (1) That a lesion of the gall-bladder and ducts may disturb the gastric function. (2) This disturbance most frequently consists of a hypersecretion of gastric juice and a diminution of gastric motility. (3) So-called hyperchlorhydria, with its accompanying symptoms, should be looked upon as an evidence of some definite pathological lesion somewhere in the gastro-intestinal tract or its appendages.

METHODS. The essential feature of the experiment was to place in the gall-bladder with as little trauma as possible a more or less smooth sterile object, too large to enter the ducts, and after appropriate intervals to study the gastric secretion. The details follow:

In the preliminary control period a series of dogs under similar conditions of environment were fed daily, after fasting at least twelve hours, a uniform test meal consisting of one dog biscuit and 50 c.c. of water. The gastric contents were removed forty minutes later and examined by the usual methods of the clinical laboratory. A sufficient number of test meals were given to secure a reliable average figure for each dog individually. Then under complete ether anesthesia the gall-bladder was opened, a sterile round pebble introduced, and the gall-bladder carefully closed again. A month was allowed to elapse in order to exclude immediate post-operative effects, and at the end of that time the gastric contents were studied, at intervals, for six weeks to eight months, and in one dog as long as eleven months, under the same conditions as before operation. The periods of observation were ten days in length, with daily examination. A control animal was at hand and was similarly studied from time to time. After the last period the dogs were chloroformed and the gall-bladder, stomach, and pancreas examined.

This technique it was found could be very easily carried out. Dog biscuit was chosen because after they were accustomed to it the majority of the dogs would eat it readily, though, as a rule, a preliminary fasting of twenty-four hours was necessary before they could be induced to take the first meal. The dogs preferred the dry ground-up biscuits, which they devoured first, drinking the water afterward. Occasionally difficulty was experienced in persuading a dog to take this meal, but as the method seemed in every way preferable to that of Lichty, that is, introducing the meal through a stomach-tube, it was adhered to in all instances. The dogs were kept quietly in their cages after the test meal for forty minutes and the contents then removed by stomach-tube. The passage of a stomach-tube in a dog is very simple if the animal is properly gagged the first few times, after which with most dogs it can be performed without a gag by merely placing two fingers between the teeth alongside the tube. No effort was made to completely empty the stomach by lavage, as this was found to be very difficult if not impossible. In all about 300 test meals

were removed and examined. The first hundred gastric contents obtained were examined in full, but subsequently only the free hydrochloric acid and the total acidity were estimated.

Five dogs were used, one of which was kept as control. The other four returned after operation to apparently perfect health and were studied for varying periods, one for only six weeks, two for eight months, and one for eleven months. At the autopsy on each of these four the foreign body was found in a gall-bladder, which was much shrunken and had greatly thickened walls, but showed no evidence of infection. Microscopic sections of the gall-bladder, stomach, and pancreas showed no significant changes.

RESULTS. The gastric analyses showed no changes as the result of the experimental procedure. (See Table.) In two animals the average acidity after operation was higher than before, while in the other two the reverse was true. In all the animals, both before and after operation, the averages for free hydrochloric acid lay between the figures 16 and 24.6. The figures obtained with Dog I will serve as an example. Before operation 20 satisfactory gastric contents were recovered, with an average figure for free hydrochloric acid of 22.9. Five weeks after operation a series of nine meals gave an average of 20.1, three months after operation a series of ten meals gave 18.6, while eleven months after operation ten meals gave 21.9. The general postoperative average was 19.8. The difference between this and 22.9 is obviously too slight to be significant.

Dog	I	V	VIII	X	XII (control)[1]
Average before operation	22.9	16	23	24.6	18.1
Average after operation	19.8	21.3	19.2	15	24.1

The motility of the stomach did not seem in any instance to have been influenced by the experiment, although Lichty found retention in some of his cases.

I wish to express my thanks to Dr. Floyd E. Keene for his performance of the operations.

CONCLUSION. 1. For the study of gastric secretion in dogs repeated test meals (eight to ten must be given).

2. The test meal can be fed by mouth, which is preferable to administering it by tube.

3. The introduction of a sterile pebble into the gall-bladder of the dog caused no change in the gastric secretion or digestion or in the morphology of the stomach or pancreas within a period of eleven months after its introduction.

[1] Not operated on, but studied at corresponding times.

CONGENITAL BILATERAL FISTULÆ OF THE LOWER LIP.

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Congenital bilateral fistulæ of the lower lip occur so infrequently and the causative factors in their production are so slightly understood that the report of a case and a review of the literature seem to be timely.

After a careful search I was able to find but 22 reported cases, my own making 23 in all.

O. H., male, aged three years. There is no member of the family who, so far as is known, has had any facial or other congenital deformity. The mother and father are normal individuals. No history of syphilis. The child is well.

The photograph shows the fistulæ as they open on either side of the middle line of the lip. There is a slight puckering of the mucosa, forming an oval in the centre, of which there is a small opening which will just admit a probe point. The tract then runs downward and inward toward the median line, and the fistulæ end in blind pockets just under the mucous membrane of the lip on the inner surface. The entire length of each fistula is about 1.5 cm. These fistulæ do not communicate, but at the terminal portion, which lies near the inner side of the lip, they are separated by a thin partition, probably of fibrous tissue. The openings of the fistulæ are filled with a glairy secretion, which is transparent, and when this is wiped away returns in a few minutes. As it does not give the child much trouble, excision at this time is not permitted.

The first observation of this condition was made in France by Demarquay[1] in 1845. Demarquay saw a mother and child, and in each there was a similar condition—harelip, cleft palate, and bilateral fistulæ in the lower lip. No microscopic examination of the tissue taken from the fistulous tract was made, and he concluded that the condition in the lower lip was due to abnormally developed, hypertrophic follicles.

In 1858 Beraud[2] described similar deformities in a case and in 1860 Murray[3] saw four cases in one family and found many other congenital deformities in other members of the same family. Murray thought the condition due to some intra-uterine disease of the mucous glands in the lip.

Richet[4] saw a grandmother and mother and child in which the condition of bilateral fistulæ of the lower lip was present. Two

[1] Gazette méd., 1845, pp. 52 and 1868.
[2] Gaz. des Hôp., 1861, No. 73, p. 291.
[3] British and Foreign Med. and Surg. Rev., October, 1860.
[4] Gaz. des Hôp., 1861, p. 174.

of these cases had been published earlier by Demarquay. Richet also saw several cases in a family in which there were other congenital anomalies in other members of the family. Those who had fistulæ of the lower lip had no harelip.

Rose, in Zurich,[5] reported a case with division of the lower lip and prolongation of the divided sides. In the ends of the two prolonged halves of the lower lip were fistulous openings, one in each side. Each opening led into a tract about 2 cm. in depth, which secreted a clear fluid. Ahlfield credits Rose with three other cases.

Madelung[6] saw a child, aged one month old, with harelip and cleft palate, and while the contour of the lower lip was normal there were present two tiny teats symmetrically placed one on either side of the middle line of the lip and puckering the mucous membrane of the lip. On squeezing the lip a clear fluid could be expressed. It was not possible to prove the existence of fistulæ with the sound, but excised portions showed, on microscopic examination, the presence of canals. These canals were lined with mucous membrane covered with epithelium and large, pointed papillæ, which differentiated it from the normal mucosa of the lip. On sagittal section muscle fiber was found on the side toward the inner aspect of the lip. These fibers ran parallel to the fibers of the orbicularis oris. On the side of the canal toward the skin no corresponding muscle fibers were found. There was therefore no structure resembling a sphincter.

Zeller,[7] in 1888, saw a case in von Bergmann's clinic, and collected all previously reported cases. There were 18 cases in all, including his own, 12 of which were accompanied by double harelip, 2 with single harelip, in 2 cases it was not stated, and in 2 cases the fistulæ of the lower lip were unaccompanied by any other congenital deformity. After exhaustive study of the embryologic and morphologic data he concludes that congenital fistulæ of the lower lip are the remains of the fetal furrows in the inferior maxilla, due to amniotic adhesions.

Zeller's reasoning is as follows: "It is known from the work of Klotz that amniotic filaments which have partly lost their attachment to the amnion remain at the connecting point with the fetal skin, and consisting of normal skin, sometimes reach a length of 2 cm. An amniotic filament (*faden*) that has prematurely lost its connection with the amnion either dies or perhaps in part is nourished by the fetus and takes on fetal characteristics —that is, is changed into tissue identical with that which arises from the same primary layers.

[5] Monats. f. Geburtskunde, Band xxxii, 1868.
[6] Archiv f. klin. Chir., 1888.
[7] Ueber angeborene Unterlippenfisteln und Wärzchen. Dissertation, Berlin, 1891.

The papillæ and fistulæ of the lower lip are probably due to such amniotic rests acting as adherent filaments in the fetal furrow of the lower lip."

Stieda[8] after reviewing the probable causes and the embryologic questions involved arrives at the following: (1) Fistulæ of the lower lip are not due to arrested fetal development. (2) Fistulæ of the lower lip arise from excessive growth through closure on both sides of the embryonal furrow of the lower lip—that is, through transformation of the lateral furrows into one canal. (3) The embryonal side furrows of the lower lip disappear usually during fetal life; in exceptional cases they persist throughout life. Stieda's case presented the typical picture in the lower lip, and also had harelip and cleft palate.

Case of congenital bilateral fistulæ of the lower lip.

Goldflam,[9] in 1907, reported a case with no involvement of the upper lip, and agreed with Stieda's conclusions.

The only cases reported from America were published by de Nancrede[10] in 1912.

De Nancrede found two cases in one family, the children presenting typical bilateral fistulæ of the lower lip, and offers the following explanation of the condition, by Dr. G. C. Huber, of the University of Michigan: "On either side the well-known median notch seen to persist some time during intra-uterine life after fusion of the two halves of the lower lip has been completed, it is not unusual to detect a slight secondary notching on each side. This becomes deeper, its deepest portion becoming gradually buried

[8] Archiv f. klin. Chir., Band lxxix, No. 2.
[9] Münch. med. Woch., January 8, 1907.
[10] Annals of Surgery, September 1912, p. 400.

until a short tubular tract lined with mucosa is formed. Why this fixation of the deepest portions should occur, permitting the normal depth of the lower lip to develop, is of course conjectural."

The treatment of the fistulæ, when treatment is indicated, is by excision.

A CONTRIBUTION TO THE ETIOLOGY OF PERNICIOUS ANEMIA.[1]

By James Taft Pilcher, M.D.,

Brooklyn, New York.

In 1860 Flint published his inferences regarding the atrophy of the stomach mucosa in cases of pernicious anemia. Ten years later Fenwick actually demonstrated the gastric lesion and worked out its pathology. Quinke, in 1876, was, however, the first, I believe, to consider the gastric changes as the causative factor of the anemia, while Martius, Lubarsch, and Koch considered the pathological findings in the stomach and intestines as secondary factors.

We appreciate now, however, that some hemolytic agent is present in the blood, and various theories have been advanced as to its origin. Hunter, in 1890, seems to have been the first to recognize this, and believed that some toxin was produced in the stomach in certain cases which was responsible for the hemolysis. Much pathological research was done to isolate this ptomain, and in 1898 Schauman, Faust, and Tallquist recovered a lipoid substance from the segments of the bothriocephalus, which when administered to animals reproduced a blood picture resembling closely that of pernicious anemia. This they considered either a sodium or cholesterin combination with oleic acid.

Ten years later, in 1909, Berger and Tsuchyia extracted a lipoid substance from the gastric and intestinal mucosa of patients who had died from pericious anemia, which showed hemolytic properties ten times stronger than extracts obtained in other conditions. They further reproduced, by animal injection of this extract, an anemia of the pernicious type.

Faber, who has probably made the most searching studies of the gastro-intestinal pathology in this disease, states that the changes noted in most intestines are postmortem, and will not be found present if the part is preserved immediately after death, but that the atrophy in the stomach is constant, and that in the stomach the etiologic factor must be sought for.

Herzberg, in a careful pathological study of 9 cases, concurs

[1] Read at the Fifteenth Annual Meeting of the American Gastro-enterological Association, and before the Brooklyn Society of Internal Medicine, November 22, 1912.

with Faber and believes that the gastric and blood phenomena in pernicious anemia arise from the same cause.

It is with the hope that some light may be thrown on this etiologic factor that the following observations are presented.

In the analysis of 433 cases of abdominal complaint presenting the symptoms of achlorhydria hæmorrhagica gastrica, most of which were observed at the Mayo clinic, there occurred during 1909, 1910, 1911, 34 cases of pernicious anemia. All cases of pernicious anemia presented the findings of an achlorhydria hæmorrhagica gastrica. Two cases of pericious anemia examined one year before the blood dyscrasia evidenced itself showed lack of free hydrochloric acid and the presence of occult blood in the stomach extract. Many of them gave long histories of chronic digestive disturbances before there was any blood change, but no stomach analysis is recorded. Several developed marked paresthesia of the extremities when their blood showed as yet only a slight secondary anemia, with no evidence of a pernicious character.

Of the 433 cases of achlorhydria examined, 149 were operated on as they presented definite intra-abdominal disease. Gross pathological findings in these showed involvement of the appendix in 52 cases; the gall-bladder in 57 cases; the gall-bladder and pancreas in 21 cases, and the stomach in 19 cases. There were 19 cases in which the gall-bladder was diseased concomitantly with the appendix.

The anamnesis in 156 of the remaining cases developed the fact that the onset of gastric symptoms seemed to bear an immediate and direct relation to various diseases and conditions, among which the incidence of infectious diseases in 38 cases, circulatory disturbances in 12, postoperative development in 14, and derangement of the ductless glands in 20 instances, deserve mention.

Appreciating generally the extraordinary degree of gastric disturbance which irritation in distant organs can produce, it may be considered even more than a presumptive conclusion that reflex nervous phenomena are responsible primarily for the inhibition of the production of hydrochloric acid in these cases.

The bacterial flora present in cases of achlorhydria hæmorrhagica, achylia gastrica, and pernicious anemia are identical. Streptococci, colon, diplococci, lactic acid, staphylococci, proteus, and leptothrix are present in great numbers. Frequently all varieties may be seen in the same field so great is their profusion. In several instances the cells of the mucosa itself had taken on phagocytic properties. A chemical analysis can be foretold almost without exception from this picture of the bacterial flora under the microscope, and ample control of these observations by repeated examination of the flora existing in cases of hyperacidity, normal and hypoacidity, and in malignant and non-malignant stenoses seem to justify the following conclusions:

That in the stomachs of patients presenting the symptoms of lack of free hydrochloric acid there is present a very large number of bacteria. Varieties ordinarily pathogenic are almost universally found either alone or in combination; that their presence is dependent upon the lowered acidity of the gastric juice, that they are actively growing bacteria, evidenced by their profusion, morphological characteristics, and staining properties; that the streptococci are probably the most important factors, since they are found in large numbers in those cases where pus was noted.

My interest in this question of the bacterial content in the stomach in cases of achlorhydria and pernicious anemia was lately stimulated by an article by McCaskey, who was able to obtain from the blood cultures, streptococci in each of the cases of pernicious anemia examined by him, in two of which administration of an autogenous vaccine appeared to be instrumental in overcoming streptococcemia, and further remarks that all the cases in which fever was present in whom blood cultures were made, showed the presence of streptococci. This was significant when one appreciates that fever occurs in approximately 80 per cent. of cases of pericious anemia. In further analyzing this phenomenon we find it continuing at times for weeks, or recurring periodically, but absent during the remissions which so frequently occur, and when, as Moffitt has noted, in certain cases of high temperature, profound exhaustion, nervous phenomena, and an enlarged spleen are noted they speak strongly in favor of an infective agency.

Fejes has demonstrated that anemia may be produced experimentally by bacterial hemolysins. Toxins produced by certain strains of streptococci have been shown to be distinctly hemolytic.

When one reflects upon the various means employed to treat pernicious anemia, the fact must seem apparent that possibly unconsciously they have all been working empirically to effect the same result, namely, the cleansing of the gastro-intestinal tract by the administration of medicines which we have lately learned to be germicidal in their action. Thus intestinal lavage, appendicostomy with colonic irrigation, administration by mouth of intestinal antiseptics, lavage of the stomach, thorough evacuation of the bowels, arsenic in its various forms, as Fowler's solution, and intravenous injections of salvarsan, autogenous vaccines, and finally hydrochloric acid.

I wish then to present for consideration these facts, namely:

1. Achlorhydria is merely a symptom denoting a marked degree of chronic gastritis.

2. It is usually evoked through extragastric irritative factors which are in many instances capable of correction.

3. There are, without exception, present in such stomachs great numbers of bacteria ordinarily considered pathogenic, among which streptococci are especially to be noted.

4. Practically all recorded cases of authenticated pernicious anemia present the symptom of achlorhydria, and in my own series of thirty-four cases the presence of occult blood in the stomach extract.

5. Thirty-four instances of pernicious anemia were noted in patients presenting the symptom of achlorhydria hæmorrhagica gastrica.

6. In a few of these cases the lack of hydrochloric acid and the presence of occult blood were known to be present at least one year before any blood changes were to be noted. In others the phenomena of paresthesia were evidenced some time previous to blood impairment, and many had suffered for years from chronic gastro-intestinal complaints.

7. Eighty per cent. of cases of pernicious anemia have increased temperature some time during the course of the disease.

8. Pure cultures of streptococci have been found by competent observers in the blood of patients with pernicious anemia who were running a fever.

9. Bacterial hemolysins are known to produce anemia resembling the pernicious type, as are other toxic substances, among which may be classed the lipoid group.

10. Efforts directed to the control of bacterial growth in the body and particularly in the gastro-intestinal tract have caused complete remissions in this disease in some instances.

11. The phenomena of occurrence, remission, and re-occurrence of the blood picture characteristic of pernicious anemia may be explained by our present knowledge of the action of toxins from whatever source, impairing the formation of antibodies until a bacteremia is produced which may be clinically recognized.

12. The toxins we have present being eliminated by the profuse flora in the gastro-intestinal tract, the impairment of bodily resistance is accomplished through their absorption and the disturbance of digestion in cases of achlorhydria.

13. Finally, reactive and combative ability of patients suffering with achlorhydria varies in different patients, and on this ground alone might be explained the relatively rare occurrence of pernicious anemia, although the occurrence of achlorhydria is fairly common.

Thus the development of pericious anemia would seem to be dependent upon a personal idiosyncrasy of certain individuals, in fact we must revert for the real etiologic factor of its inception to an embryonic tendency, the presence of which we are not as yet able to determine until it has been stimulated into an active destructive agent of the blood by the toxins absorbed from the profuse bacterial flora present in the stomach.

THE ROLE OF HYDROTHERAPY IN THE TREATMENT OF PELLAGRA.

By George M. Niles, M.D.,

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Like the task of firemen, who are compelled to fight the evident and rapid combustion of some huge and many-sided structure—not halting their efforts in order to discover its origin, nor abating their struggles to quench the flames, while others of their number are seeking the hidden source—so this problem of pellagra has been abruptly thrust upon the medical profession of the United States.

It has assumed menacing proportions with all the suddenness of a forest fire, and, while many earnest investigators have been delving at the etiologic questions involved, the actual therapy would not wait upon their dicoveries or conclusions. Pellagra as a pathological entity has been placed before us, and of necessity we have had to administer some form of treatment, whether rational or otherwise.

The writer admits, with sorrow, that the etiology of pellagra is still in doubt. The zeists, or those who believe with the late Lombroso, that "In pellagra we are dealing with an intoxication produced by poisons developed in spoiled corn through the action of certain microörganisms in themselves harmless to man," are still in the majority. The antizeists, however, number among their ranks some doughty spirits, and we have the satisfaction of knowing that this important question will never be settled until it is settled correctly and beyond peradventure. In the meanwhile various procedures have been advocated, some apparently possessing merit; others most bizarre and fantastic.

It may be said that, with the exception of a few pessimistic individuals, who have found no distinctive pathologic lesions other than those coincident with senility, and therefore have consigned pellagra to the realm of incurable maladies, the larger number of those actually called upon to treat this disease have approached the difficult and obscure problems with a courageous feeling. They have evolved a fairly complete line of therapy, meeting with a large measure of success most of the indications, and their good results are not necessarily dimmed by the fact that some of their methods are empirical.

The medicinal, dietetic, hygienic, and even psychic treatment has been covered in recent literature, easily available to those interested. In hydrotherapy, though, we have an auxiliary whose helpful potentialities have not been sufficiently appreciated, and

whose aid may be invoked with confidence in some of the most distressing phases of pellagra.

No claim for originality as to methods is made, but in their special application to this protean disease the writer trusts that some new and worthy suggestions may be adduced.

Let it be briefly stated that in pellagra we have a fourfold syndrome—gastro-intestinal, dermic, nervous, and psychic—one or more units of which may predominate. Some of the typical cases may show at once all four units of the symptom-complex, but, as a general rule, one to three are manifested, while the others are partly or wholly in abeyance.

It is hard to imagine a more melancholy spectacle than a confirmed pellagrin, with his anorexia and indigestion and diarrhea; his parched and discolored hands, and perhaps face and feet; his burning tongue and extremities, coupled with shooting pains in different parts of the body; and often, overshadowing all, his changed mentality, varying in temperamental shade from indefinite blues to the blackness of melancholy and dementia.

Granted that all other possible therapeutic means are being assiduously employed, hydrotherapy may be advantageously used, first for gastro-intestinal symptoms. For the frequent and sometimes constant nausea the drinking of from two ot six glasses of tepid water once or twice daily, so that by its emesis the stomach may be washed, will prove beneficial. Where it can be expertly performed, lavage once daily is better; but unless the medical attendant is an adept at introducing the stomach tube, lavage is best not attempted. In addition a cold water bag over the epigastrium placed there a half-hour before meals, and kept on fifteen to thirty minutes, plus drinking a half glass of iced water, exerts both a sedative and stomachic effect.

The frequent diarrhea may be greatly alleviated by hot colon irrigations, followed by cold sitz baths of five to ten minutes duration. This double procedure may be repeated two to four times daily when the patient is not too weak.

Another valuable method consists in the use of cold abdominal compresses, sometimes called "Neptune's girdle," in which the abdomen is encircled by a thick towel of liberal proportions, saturated with cold water. This may be removed and resaturated every one or two hours. Copious water-drinking is generally advisable, tending by its volume to keep the kidneys "flushed," and, by its solvent power, diluting and washing out many of the toxins. The diarrhea, being of central origin, and mainly compensatory in character, is rarely increased by an abundance of water in the body. Occasionally the writer has seen the bowels apparently regulated by this means after they failed to respond to astringent or dietetic endeavors.

For the occasional constipation, warm enemas, high if necessary, are always in order, and always efficacious.

To increase skin elimination there can be used the so-called "long bath" or various hot packs. A caution in regard to the use of the electric-light chamber is timely, for this is contraindicated in pellagra on account of the danger of kindling or increasing dermal symptoms. The skin of all pellagrins is peculiarly susceptible to the influence of any strong light, and the attending physician will avoid some troublesome complications by keeping this fact in mind.

For the dermal manifestations, expressed by erythema and sundry grades of dermatitis, hydrotherapy has but a limited field of usefulness. Apart from keeping clean the surface of the body, water has no specific effect; indeed, where the skin symptoms are markedly eczematous it is well sometimes to omit bathing the crusted surfaces for a brief season, using oily applications instead. In the occasional troublesome itching of the skin a cool or cold saline bath is often grateful. This may be made by the addition of chloride of sodium, seven pounds; chloride of magnesium, one pound; sulphate of magnesium, half pound; water, thirty gallons.

In many of the neuroses we derive most comforting results from hydrotherapy. The burning hands and feet may be greatly soothed by either ice-cold compresses applied at frequent intervals, or baths in hot mustard water. In addition may be employed hot leg-and-arm-packs, and revulsive compresses to the spine. In the use of the last named the hot compresses should stay on from three to five minutes, while thirty seconds will be sufficient for the cold. Three treatments daily, of thirty minutes' duration, are sufficient, and the relief obtained is often remarkable. These neuroses, being the painful expressions of lesions in the nerve centres, are most stubborn, sometimes remaining in evidence long after all other traces of pellagra have disappeared; and these special baths, packs, and revulsive compresses have proved helpful in a number of cases under the observation of the writer, where analgesics and anodynes had failed to afford any lasting cessation.

It is perhaps in those pellagrins where the psychic manifestations predominate that hydrotherapy holds the widest and most useful scope. For the mental disquietude with transient exhilaration, associated with insomnia, the neutral full bath at 94° to 96°, lasting from one to two hours, morning and evening, exerts a soothing effect. This may be augmented by warm compresses to the back of the neck, kept on about fifteen minutes, and applied three times daily. Should the patient seem somewhat autotoxic a free perspiration can well be induced at the end of these neutral baths by the use of hot packs, followed by suitable and brief cold applications.

He should also drink water freely. In this connection a daily

hot enema is often comforting even if not specially indicated by any abnormal bowel condition.

For mental depression and melancholia the cold percussion spinal douche bath exerts a decidedly good effect. If the patient is robust physically this douche bath may begin as low as 45°, but 65° to 70° is usually better. Should this not be agreeable, spinal sponging, alternating with hot and cold water, affords a passable substitute. Pellagra, being in the main an afebrile disease, cold packs are seldom indicated, though in some "typhoid" cases, with muttering delirium, they hold a doubtful place.

For the anemia and debility so often following in the wake of acute pellagra, cold measures, discreetly applied, yield not only a tonic effect but also an appreciable effect on the red blood count. This was proved by Prof. Winternitz as far back as 1893.

Practically all of these hydriatic measures, with the possible exception of the alternating douche, can be carried out at the home, though naturally a well-equipped institution, with trained attendants, can apply them with greater ease and precision.

The writer feels constrained to acknowledge valuable suggestions from Mr. W. W. Blackman, of Atlanta, whose wide experience in hydrotherapy, and painstaking efforts have demonstrated the utility of hydrotherapy in many instances.

Until a specific is found for this dread disease it is our duty to afford these forlorn sufferers every intelligent means of relief, and, from observation of over seventy-five pellagrins, with whom some form of hydrotherapy was employed, and in whom some measure of relief was noted in every instance, the writer presents it as worthy the thoughtful consideration of those who are burdened with the weight of this difficult problem.

THE ANALOGIES OF PELLAGRA AND THE MOSQUITO.[1]

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With the publication of Sambon's *Progress Report*, in 1910, the investigation of pellagra really began. Before that time men studied a cereal, and thought they were studying a disease. Sambon's name will be associated with two great propositions concerning the nature and cause of pellagra: (1) The hypothesis that it is

[1] Read before the Second Triennial Congress on Pellagra, Columbia, South Carolina.

an infectious disease, and (2) the hypothesis that it is an insect-borne disease.

To many students these hypotheses stand as facts, because supported by much evidence and therefore believed; to others they are only hypotheses, and therefore only theories, because unproved. The third idea advanced by Sambon, namely, that the Simulium fly is the specific insect carrier, is open to far larger doubt than his first two propositions; and reasoning by analogy, and by the analogies of etiology, and by many notable comparisons, this fly is not nearly so apt to be the insect agent as is the mosquito.

The following objections hold against the Simulium as the disease carrier: So far as is known, the bite of the Simulium is poisonous rather than infectious; bearing toxins rather than parasites. The disease appears in America chiefly in those who are not field laborers, and who are little exposed to its bite. Pellagra occurs in sporadic cases in cities, among women who stay at home, and in asylums within doors, where the Simulium neither comes nor bites. It does not present the regularity of seasonal incidence, adults living through the winter, the repeated broods during spring, summer, and autumn, in enormous numbers as does the mosquito. It does not move in swarms far from its stream home, and, therefore, does not explain those cases arising at a distance from any running stream. It is more numerous in cold countries and on the coast of all continents, while pellagra avoids cold climates and seeks the interior rather than the coast.

The insect which carries the pellagrous parasite must account for and explain certain ecological and geographical facts of the disease, such as: Its seasonal relations, its periodicity, its recurrences, and its chronicity; its endemic relations, its occurrence chiefly in rural environments, its absence from cities except in sporadic cases; its peculiar geographical distribution over the world, in Africa along the Nile, in southern Europe, southern North America, and the West Indies; its predominance among females and in those who work around the house, as in women who wash clothes near the home; its attack on all ages and both sexes, infants, adults, and octogenarians; the spread of the disease in new areas, its epidemics, and their variations in severity; the severity of the disease in its first sweep of a new area, as in Roumania and America; and the increasing immunity to the disease in Spain and Italy, where it has raged for two centuries; its association with mosquito-borne diseases; its association with streams, swamps, foothills, valleys, lowlands, and standing water in damp areas.

The following analogies of etiology and comparisons with mosquito-borne diseases show a relationship to a common insect host, the mosquito.

Pellagrins are insane, become inmates of asylums, and insane inmates conversely become pellagrous, as in the Alabama epidemic

reported by Searcy, the Illinois asylum cases reported by Zellar, the Jamacia cases reported by Williams. The two sexes are more equally affected in those who develop the disease within the asylums, and within doors both sexes are equally exposed to the infecting agent. The insect probably lives and bites in houses.

In Italy, Roumania, and America pellagra predominates in females and in those individuals of both sexes that remain in and around the home during the day. They are more exposed than those away from home working in the fields or woods.

The mosquito accounts for the fact that a woman in the family may become pellagrous, and other women in the same house develop the disease. They are together day and night equally exposed to the infecting agents. On account of this spread of the disease in one family, under one roof, chiefly among women and children, it has in certain endemic areas been considered contagious, as was yellow fever before the Stegomyia fasciata was discovered to be the agent in its distribution.

For pellagra to appear in the United States, either the parasite or both parasite and insect host must have been lately introduced. For it to spread the parasite must be naturally fitted to the climate, seasons, and to insect and human hosts; the insect host must be adapted to climate, seasons, habitat, and environment. For such adaption to exist on the part of the insect it must have been in America many centuries and in enormous numbers. The parasite of pellagra has, therefore, probably been recently introduced, and its specific insect host is a natural, long time inhabitant, present in enormous numbers, as is the mosquito. For instance, Stegomyia fasciata was found in Milledgeville, Georgia, in September, 1912, in a soft-drink stand, but the yellow fever agent was lacking, and there was no yellow fever in the city.

Like malaria and filariasis, pellagra is chiefly rural. Rome escapes malaria, and yet in the marshes without the city the disease rages. Bucharest, Milan, and Atlanta escape pellagra, but in the regions round about the disease persists. Even in large cities sporadic cases of malaria and pellagra develop, they usually occur on the outskirts, where the drainage is poor and filth and sewerage abound.

Pellagra has an unquestioned relation to streams, swamp areas, standing water, and places that breed the mosquito, as have malaria and yellow fever. This is true in Egypt along the Nile, in Greece, Roumania, Italy, Spain, and America.

Hills tend to escape in areas visited by pellagra, malaria, yellow fever, and filariasis.

In areas both malarial and pellagrous, rains and floods that increase malaria, also increase pellagra. With the proper drainage of such an area, both diseases decrease and later disappear, as illustrated by the Landes in southern France.

Mosquito-borne diseases have a seasonal incidence. Yellow fever in spring, summer, and autumn; malaria in spring, summer, and autumn; pellagra in spring, summer, and autumn. Yellow fever depends in its endemic areas upon the time of the appearance of the Stegomyia; malaria upon the Anopheles; pellagra upon its specific mosquito host. The first attack of pellagra may develop any time from early spring to fall, for the reason that several broods of the mosquito host appear during this period.

Malaria, yellow fever, filariasis, and pellagra tend to appear and become epidemic with spring and early summer. Within the bounds of latitude the outbreak of these diseases is later in the spring and summer as one goes farther North, and earlier as one goes farther South. The annual pellagrous attack tends to be earlier the second summer, and the earlier the spring season the sooner the attack; this is also true of malaria.

Pellagra appears and persists in cotton-mill communities in the South, and is absent from cotton-mill and factory communities in the Eastern States. There is probably an infected mosquito in the South which is absent from the East. The usual factory reservoir, the puddles of water, the surface closets, the washtubs in every back yard, the rain-water barrels, the mosquito-breeding areas, the women at home, are all consistent with the mosquito as a reasonable hypothesis.

Malaria, yellow fever, filariasis, and pellagra all tend to cease spreading, the cases improve, and the disease dies away with the coming frost, cold, and winter. All these diseases avoid the winter because of the influence of the cold season upon both parasite and insect.

Pellagra, like malaria, yellow fever, filariasis, and dengue fever, has its epidemics, its years of severity and mildness, its ebb and its flow of prevalence and of intensity.

Pellagra, malaria, yellow fever, and filariasis are all endemic in restricted areas for a century, and epidemic at different times. These endemic areas are mosquito breeding-areas, and in times of epidemic mosquitoes are present in great numbers.

Pellagra and malaria have latent periods and periods of activity, due to the change in the seasons, the fixed life-period of the parasite, and its alternating periods of activity and rest; and to changes in climate, altitude, and vitality. Spring may usher in an attack of malaria or of pellagra. A surgical operation or a confinement may float a latent pellagra or a latent malaria.

Pellagra, malaria, yellow fever, and filariasis are non-contagious and non-inheritable.

The incubation period in malaria is ten days to three weeks; in yellow fever thirty-six hours to fourteen days; in pellagra probably two to three weeks, certainly less than four weeks. Sambon recently found pellagra in an infant one month old. This fact signifies kinship of insect carriers.

The parasites that cause malaria, yellow fever, and filariasis are more restricted in their endemic areas and in their geographical distribution than their insect hosts. Anopheles has a wider distribution than the Plasmodium malariæ; Culex fatigans than the Filaria bancrofti, and Stegomyia fasciata than the yellow fever agent. The same relational distribution of parasite and mosquito probably applies to pellagra.

Pellagra is absent from Ireland, where Simulium flies occur in abundance, but mosquitoes are relatively scarce. Malaria, yellow fever, filariasis, and dengue fever are also absent from Ireland. Furthermore, the poorest Irish peasants, whose poverty is famed and world-wide, eat Irish potates and "yellow meal," the latter being imported as shelled corn from America, Africa, and Russia through the Baltic Sea, and yet there is no pellagra in Ireland.

Scotland,[2] practically all of England, and Australia are free from pellagra, malaria, filariasis, and yellow fever. Canada is likewise free from all these diseases, except a small area on the shore of Lake Ontario, where a few malarial cases occur. Except for Illinois, where five hundred cases of pellagra have occurred, and a few sporadic cases in the northern and western United States, pellagra, malaria, and yellow fever all tend to remain in the southern United States and farther southward. A further significant fact is that the Illinois cases are chiefly asylum cases.

Practically all pellagrous areas are also malarial areas, except in the small island of Barbadoes in the West Indies, where pellagra, yellow fever, and filariasis occur, but no malaria. On the nearby island of Jamaica, however, all four diseases exist, pellagra, malaria, yellow fever, and filariasis. Pellagra is to Italy and Roumania what yellow fever is to the West Indies, and what malaria is to Greece and to the foothills of the Himalayas in India.

Pellagra extends from 8° to 45° north latitude. Forty degrees north latitude cuts the pellagrous area of Europe into northern and southern halves, and 45° mark its northern limit; 30° north latitude cuts the pellagrous area of Africa; and the same parallel cuts the North American area, with 8° in Panama as the southern and 45° in New York as the northern limit even in sporadic cases. The distribution of pellagra in three continents is marked by an average latitude of 30° to 45°, and 90 per cent. of the pellagra cases in the world occur in this belt of 15°, or a distance of 1000 miles from north to south. In this belt occur also malaria, yellow fever, filariasis, dengue fever—all the mosquito-borne diseases. Furthermore, while Anopheles occurs in this area, the northern distribution of pellagra generally marks the northern limit of Stegomyia fasciata, and the household mosquito, Culex fatigans. In pellagrous territory on three continents are these three mos-

[2] Sambon thinks pellagra exists in Scotland.

quitoes. If the Simulium were the insect carrier, we should expect pellagra in northern as well as southern Europe, in Ireland as well as in Italy, in Minnesota and Canada as well as in Georgia and Panama.

Returning now to the ecological and geographical facts of the disease, the mosquito accounts for its seasonal relations, periodicity, and recurrences; its endemic relations, rural habitat, and sporadic appearances in cities; its peculair geographical situation in Africa, Europe, and America; its predominance among females and those who stay much at home; its attack on all ages and both sexes; the spread of the disease in new areas; its first sweep of severity in such areas, and later its gradual decrease and the relative immunity of the inhabitants; its presence along streams and in mosquito-breeding areas.

Whether a single species of the Culicidæ harbors the pellagrous parasite, as in yellow fever, or more than one, as in malaria, and what this particular species may be, is a question for the future. It will probably prove to be a rural breeding, house-living, day-biting mosquito. To us and perhaps to those who shall come after us the problem remains—the investigations, the experiments, and the proof.

AN INTENSIVE STUDY OF THE EPIDEMIOLOGY OF PELLAGRA. REPORT OF PROGRESS.[14]

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(Concluded from page 66, July, 1913.)

Part II.

XII. Relative Prevalence, Severity, and Mortality Rates in Recent Years. Pellagra is not a reportable disease in the State of South Carolina, nor do the State laws require notification of deaths from pellagra to the health authorities.

[14] From the Thompson-McFadden Pellagra Commission, New York Post-Graduate Medical School and Hospital.

The data to be analyzed were obtained from a number of sources. The 282 cases studied in detail by the Commission afforded one source. In the City of Spartanburg, official records are on file covering deaths from all causes within the city, and thus it was possible to secure accurate mortality statistics for the city. There are some five or six undertaking establishments in the county, as a whole, and the two establishments in the city of Spartanburg sell very nearly all the coffins used throughout the county. These two establishments keep on file the names, causes of death, and other information concerning the deceased for whom coffins are furnished, and they very courteously permitted us to make abstracts from their records. From these records we obtained information of importance. From the members of the medical profession throughout the county we secured much valuable information relating to prevalence and mortality rates for 1912 and previous years. From pellagrins themselves and from others we were able occasionally to obtain information concerning individual cases. Dr. Babcock, of South Carolina, kindly furnished us with information covering the cases admitted to the State Hospital for the Insane from Spartanburg County.

Although we availed ourselves of all these sources of information, we wish to emphasize the fact that this study is still far from complete. We hope, however, to make it more comprehensive and complete during the course of our studies in the same county in the summer of 1913.

The opinion was expressed by many physicians in Spartanburg County, that pellagra was not so prevalent in 1912, as was the case in 1911. We might say, further, that a like impression prevailed in many other parts of South Carolina and in other Southern States.

The statistical data at hand for Spartanburg County are subject to analysis in several ways:

1. From the information available we have determined as nearly as possible the actual number of cases of the disease existing in the county each year, without consideration of the year in which the disease was contracted and without reference to recurrences.

In 1912	there were 376 cases (minimum).
In 1911	there were 285 cases (minimum).
In 1910	there were 115 cases (minimum).
In 1894 to 1910	there were 114 cases (minimum).

It is quite evident that pellagra was not recognized as such, to any extent, until the year 1909.

We have endeavored to secure from the practising physicians in the county accounts of the first and other early cases occurring in their practices. As yet this information is incomplete, but it establishes the fact that the disease has existed in the county

sporadically for a number of years. Dr. Fike of Spartanburg, has the record of a patient dying of pellagra in 1894, although not at the time recognized as such. The patient was an adult female, and three other members of her family are said to have died of the disease. One of the first cases which developed in the city of Spartanburg was that of a young woman in a well-to-do family. She contracted the disease and died of it in 1902. Dr. Jefferies, of Spartanburg, has the record of a patient who died of pellagra, in November, 1903, but the disease was unrecognized as such until years afterward.

While there is no doubt that pellagra has existed in this section for a number of years, information obtained from the medical profession throughout the county indicates very clearly that the cases must have been more or less sporadic until within recent years. The general impression is held that sporadic cases occurred until about 1909, at which time there was a marked increase in the number of cases; that during 1910 and 1911 the disease became more prevalent; while in 1912 there was a slight decrease in incidence. The perceptible increase of cases in 1909 may be accounted for in part by the fact that the disease was not until then generally recognized as pellagra. We have consulted with many medical men in Spartanburg County and in other parts of South Carolina, and in other States, and it is our belief that the large number of cases recognized in 1910 and 1911, as compared with the number recognized previous to that time, cannot alone be explained on a basis of general failure to recognize the disease in earlier years. Non-recognition unquestionably explains some of the increase, but we are thoroughly convinced that there has been an actual and quite perceptible increase in the number of cases within the past three or four years.

2. A second analysis of our data shows that the minimum number of cases of pellagra in Spartanburg County from 1894 to October, 1912, was 495. This is obviously a conservative estimate, as prior to 1911 our data are made up largely of cases in which the disease terminated in death.

3. We have endeavored to determine the actual number of new cases of the disease occurring each year. It is possible to determine this with a reasonable degree of accuracy for 1912 and with a fair degree of accuracy for 1911, but prior to that time the incidence rates (annual) are altogether a matter of conjecture. We have seen that there were at least 376 cases of pellagra in Spartanburg County in 1912. Of the cases seen during our study in 1912 (282), 97 contracted pellagra in 1912, and of 94 others not included in our series we have knowledge of the fact that 16 contracted the disease in 1912. The minimum total of new cases for 1912 is thus 113. In 1911 the total number of cases in the county was 285. Among the cases included in our series (282), 100 contracted pellagra in 1911, and we have record of 20 other cases contracting it in 1911,

making a total of 120. Of the remaining 165 cases existing in the county in 1911 the information at hand is more or less indefinite, but unquestionably some of this number contracted the disease in 1911.

Prior to 1911 definite statistics are too meagre to warrant analysis. Our statistics suggest that pellagra, so far as new cases are concerned, was somewhat more prevalent in 1911 than in 1912.

The annual case death-rate among pellagrins was as follows:

Year.	No. of deaths.		No. of cases.	Per cent. of deaths.
Unknown	8			
1894	1			
1898	1			
1899	1			
1901	2			
1902	2	25	114	22
1903	1			
1904	1			
1908	2			
1909	14			
1910	32		115	28
1911	54		285	19
1912	47		376	12

It should be understood that these mortality statistics are of pellagrins who have died from all causes, not deaths from pellagra alone. In a number of these cases the pellagrous symptoms were of but little moment, the actual causes of death being other factors, among which may be mentioned tuberculosis and senility. The morbidity and mortality statistics for 1910 and the years preceding are not sufficiently complete to warrant any deductions. Those for 1911, showing 19 per cent. deaths, and for 1912, showing 12.5 per cent. deaths, represent more nearly the relationship between the morbidity and mortality rates as they exist at present.

Death during the initial attack is not uncommon. In the series of 282 cases studied by this Commission, 97 contracted the disease in 1912, and 5 of these cases died during the initial attack.

SUMMARY. The following general statements concerning relative prevalence and mortality seem to be warranted:

Sporadic cases have been observed in Spartanburg County since 1894. During the past three or four years there has been an alarming increase in the number of cases. The number of new cases developing in 1911 was somewhat greater than in 1912, although the difference was but slight. When the disease first appeared in Spartanburg County the symptoms were frequently severe and the death-rate appears to have been high. The number of cases in the county is increasing while the death-rate appears to be decreasing.

XIII. CLINICAL OBSERVATIONS ON PELLAGRA. A. *Chronicity and Periodicity, with a Study of the Influence of Climatic Conditions.* 1. *Chronicity.* We have observed no differences in the symptomatology, and more particularly in the chronicity, of the disease as

it exists in this country and in Italy, except the fact that the mortality rates in this country two or three years ago were apparently much higher than those obtaining in Italy at the same time. A few of the cases in the present series died during the initial attack in 1912, while others presented a wide gradation of symptoms ranging from those involving the cutaneous, gastrointestinal, and nervous systems to those in which the cutaneous system alone was involved.

ORIGINAL ATTACK AND ANNUAL RECURRENCES.

Early history indefinite; recurrence, 1912	1
1904.	
First attack, 1904; recurrences, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912	1
1905.	
Indefinite history, 1905 to 1911 inclusive; recurrence 1912	1
First attack, 1905; recurrences, 1906, 1907, 1908, 1909, 1910, 1911, 1912	1
1906.	
First attack, 1906; recurrences, 1907, 1908, 1909, 1910, 1911, 1912	1
1907.	
First attack, 1907; recurrences, 1908, 1909, 1910, 1911, 1912	1
First attack, 1907; no clear history, 1908, 1909, 1910; recurrences, 1911, 1912	1
1908.	
First attack, 1908; recurrences, 1909, 1910, 1911, 1912	2
First attack, 1908; recurrences, 1909, 1910; no recurrence, 1911; recurrence, 1912	1
First attack, 1908; no recurrences, 1909, 1910; recurrences, 1911, 1912	1
First attack, 1908; recurrence, 1909; no recurrence, 1910, 1911, 1912	1
1909.	
First attack, 1909; recurrences, 1910, 1911, 1912	11
First attack, 1909; indefinite history, 1910, 1911; recurrence, 1912	1
Indefinite history, 1909, 1910, 1911; recurrence, 1912	1
First attack, 1909; no recurrence, 1910; recurrence, 1911; no recurrence, 1912	1
First attack, 1909; no recurrences, 1910, 1911, 1912	1
First attack, 1909; recurrences, 1910, 1911; no recurrence, 1912	1
First attack, 1909; no recurrences, 1910, 1911; recurrence, 1912	1
First attack, 1909; recurrence, 1910; no recurrence, 1911; recurrence, 1912	1
1910.	
First attack, 1910; recurrences, 1911, 1912	30
First attack, 1910; no recurrence, 1911; recurrence, 1912	3
First attack, 1910; recurrence, 1911; no recurrence, 1912	12
Indefinite history, 1910; recurrences, 1911, 1912	1
First attack, 1910; no recurrence, 1912	3
First attack, 1910; no history, 1911, 1912	1
1911.	
First attack, 1911; recurrence, 1912	69
First attack, 1911; no recurrence, 1912	29
Indefinite history, 1911; no recurrence, 1912	1
Indefinite history, 1911; recurrence, 1912	1
1912.	
First attack, 1912	97
Total	277

It will be noted that in some of these cases the disease was contracted originally in 1904; in others, in 1905 and every year thereafter to 1912, inclusive. Occasionally the history of previous attacks was indefinite, and such cases are so classified.

In this series there are 55 cases of pellagra recognized from one to five years ago by the attending physicians in which the annual recurrence has failed to appear in one or more seasons. In some of these cases the disease has reappeared after an intermission of one or two years, while in other instances symptoms have been present for one or more seasons, and have never since recurred. The following cases illustrate this point:

First attack, 1908; recurrence, 1909; no recurrences, 1910, 1911, 1912	1
First attack, 1909; no recurrences, 1910, 1911, 1912	1
First attack, 1910; no recurrences, 1911, 1912	3

In addition to these five cases we have records of a few other cases in Spartanburg County, not included in this series, in which patients have been without symptoms for a period of two, three, or more years and appear to be cases of recovery from the disease.

Our individual case histories show that a number of adult females have borne children since contracting pellagra, but in only 22 cases is the relationship of the pregnancies to the development of symptoms sufficiently definite to warrant analysis. In 16 of these cases (75 per cent.) there were no symptoms of pellagra during pregnancy. These observations cover only a small number of cases, and this subject will be investigated more in detail in this series and in additional ones during the summer of 1913. Pregnancy seems to show a tendency to inhibit the development of pellagrous symptoms.

2. *Periodicity.* A study of the literature of pellagra gives one the impression that there is a definite seasonal periodicity. We are led to believe that the disease appears in the spring; that there is a relative decrease in the number of cases in midsummer; that a fall recrudescence occurs, and that there is a tendency for symptoms to reappear at the same time each year.

Sambon cites the spring and fall periodicity as a strong argument in favor of his hypothesis that the disease is of protozoal origin and transmitted by a blood-sucking insect, a species of Similium.

We have undertaken some studies bearing on this phase of the subject. It is evident that these observations, except for the year 1912, must be based on the statements of patients suffering with pellagra. We have endeavored to control such statements and to add to their reliability by information obtained from other members of the household, and more particularly by that obtained from the attending physician. The cases will first be considered by month of onset of symptoms. Chart 9 represents graphically the month of onset of symptoms arranged by years. It is understood, of course, that this chart represents not only the month of original

onset in each case, but includes also the recurrences in each case year by year.

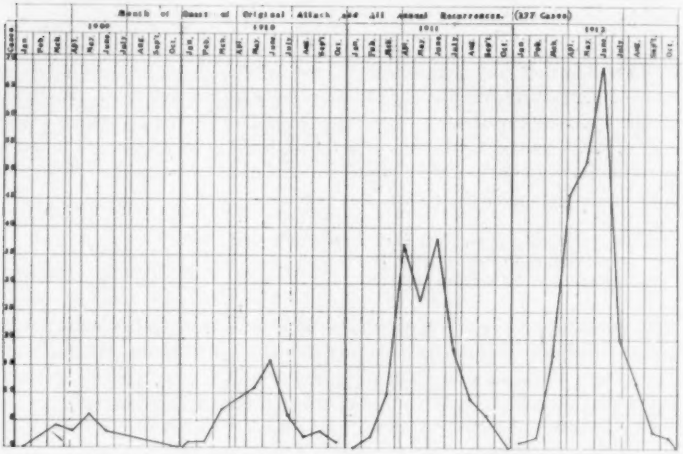

CHART 9.—Month of onset of original attack and all annual recurrences (277 cases).

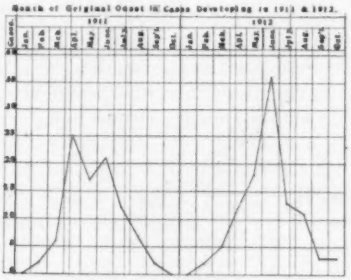

CHART 10.—Month of original onset in cases developing in 1911 and 1912.

In Chart 10 we have analyzed further the 1911 and 1912 cases from the standpoint of original onset of symptoms when the disease was contracted. It is evident from these charts that cases begin to show symptoms in the early spring, that there is a gradual increase in the number showing symptoms until the month of June, when the incidence curve reaches its highest point, and that after the month of June the incidence-rate falls quite rapidly. It is also evident that there are no spring and fall recrudescences of pellagra in Spartanburg County. On the contrary, cases begin to show symptoms in the spring, increase in number until midsummer, and then rapidly decrease.

We have analyzed the recurrent attacks with a view of determining whether or not there was any marked tendency in each individual case for active symptoms to appear during the same month year after year, with the following results:

INTERVAL BETWEEN ONSET OF SUCCESSIVE ATTACKS.

	11½ to 12½ months.	11 to 11½ months or 12½ to 13 months.	Less than 11 or more than 13 months.
Cases contracting pellagra in 1909	4	2	5
Cases contracting pellagra in 1910	12	17	10
Cases contracting pellagra in 1911	21	20	24
	37	39	39

We have analyzed still further the uniformity of recurrences, first by ascertaining the date of appearance of symptoms in individuals who contracted the disease in 1910 and comparing these dates with date of recurrence of symptoms in the same individuals in 1911, and second, by tabulating the same facts for cases developing originally in 1910 and 1911 and recurring in 1912.

Among the cases showing symptoms originally in 1910 the recurrence in 1911 was a month or more earlier in 14 cases, during the corresponding month in 27 cases, and a month or more later in 17 cases. Among the cases contracting the disease in 1910 and 1911 the recurrence in 1912 was at least a month earlier as compared with the appearance of symptoms in 1911 in 36 cases, during the same month in 48 cases, and at least a month later in 33 cases.

It is evident from this analysis that there is no particularly marked tendency for the seasonal recurrences to reappear during the same month year after year.

3. *Influence of Climate.* Climatic conditions are said to influence the periodicity of the disease. If during the spring months the precipitation is high, temperature low, and number of rainy days excessive, there is said to be a delay in the appearance of acute symptoms, more particularly those involving the skin. One of us had occasion to observe this influence in the spring of 1910 while investigating conditions in northern Italy. In March and April of that year the weather conditions in the provinces of Milan and Bergamo were quite unsettled, precipitation was excessive, there were many rainy days, but little sunshine, the temperature was low and the atmosphere was damp and chilly. At this time there were but few cases showing active symptoms of pellagra. The delay in appearance of active symptoms was attributed to unsettled weather conditions. We were informed, further, that it had been observed for many years that unsettled weather conditions in the spring always delayed the appearance of active

symptoms of the disease. We have been able to compare this general impression as regards conditions in Italy with similar conditions in the South. Early in May, 1912, we investigated the prevalence of pellagra in different sections of South Carolina, in North Carolina, and in Georgia. The physicians consulted informed us that there was a delay in appearance of cases showing active symptoms, and that whereas in April, 1911, they had observed many such cases, in April, 1912, they had seen but few. We were informed that spring and settled weather conditions were present much earlier in 1911 than was the case in 1912. This general impression is confirmed by the fact that farmers in the states mentioned were able to get their crops under way quite early in 1911 while in 1912 they were delayed for from three to six weeks. In Spartanburg County it was possible to secure much more detailed information covering weather conditions. The general information given us is in agreement with that outlined above.

In order that these general impressions may be controlled, we have obtained from the United States Weather Bureau its reports on weather conditions in Spartanburg County, South Carolina. The available information from this source, which includes monthly precipitation, monthly mean temperature, and number of rainy days, is presented in Charts 11, 12, and 13.

It is evident from an analysis of the monthly precipitation curves for 1911 and 1912 that in 1912 during the months of January to June inclusive, except for the month of April, the monthly precipitation was greatly in excess of that for the like period in 1911.

Analysis of the monthly mean temperature curve for 1911 and 1912 shows that in 1912 for the months of January to June inclusive the temperature was, in general, appreciably lower than was the case for like months in 1911.

A study of Chart 13 (number of rainy days) shows that for the first six months in 1912, except for the months of March and April, the number of rainy days per month was in excess of the number for the like period in 1911. While there were more rainy days in March and April, 1911, than for the same months in 1912, the amount of precipitation for these two months in 1912 was in excess of that for 1911.

These charts, considered as a whole, indicate quite clearly that settled weather conditions with relatively high temperature and low precipitation existed in Spartanburg County at an earlier date in 1911 than was the case in 1912.

The relationship between climatic conditions existing in 1911 and 1912 and the appearance of acute symptoms of pellagra can be determined by referring to Charts 9 and 10. There was quite a definite tendency for symptoms to appear at an earlier date in 1911 than was the case in 1912. The incidence-rate in both charts was high for the month of April, 1911, while in 1912 the incidence-

rate for April was comparatively low, especially in respect to new cases, and the maximum rate was not attained until the month of June.

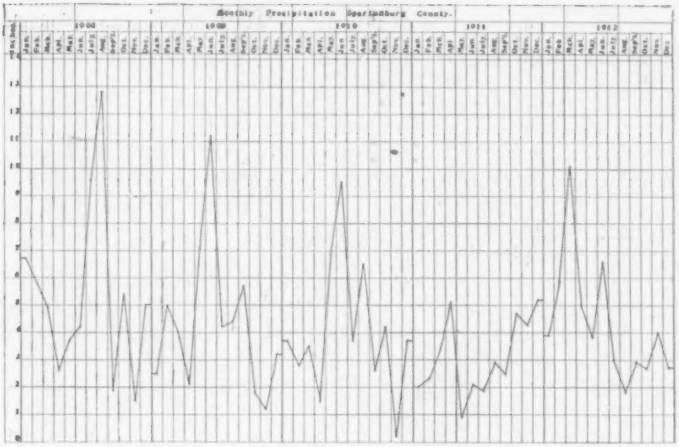

CHART 11.—Monthly precipitation, Spartanburg County.

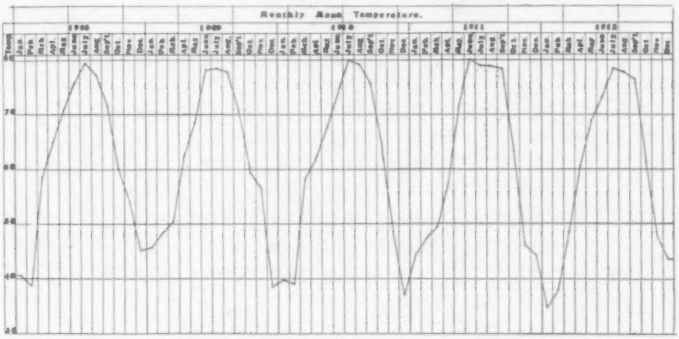

CHART 12.—Monthly mean temperature.

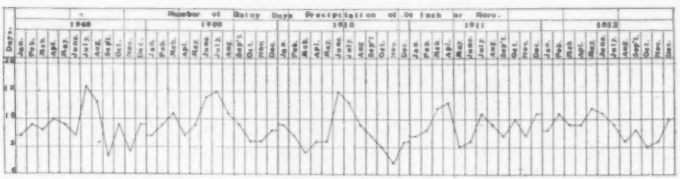

CHART 13.—Number of rainy days, precipitation 0.01 inch or more.

SUMMARY. 1. *Chronicity.* In a large proportion of the cases in this series the disease exhibited marked chronicity. In 20 per cent. the annual recurrences had failed to appear in one or more seasons. Pregnancy seems to show a tendency to inhibit the development of pellagrous symptoms. In 2 per cent. of the cases no symptoms had been present for from two to three years, and these appear to be cases of recovery from pellagra.

2. *Periodicity.* Cases begin to show symptoms in the early spring, increase in number until midsummer, and then rapidly decrease. There was no evidence whatever pointing to any spring and fall recrudescences, so frequently referred to in the literature of pellagra. There is no particularly marked tendency for the seasonal recurrences to appear during the same month, year after year, in the same individual.

3. *Influence of Climate.* Climatic conditions appear to influence the development of symptoms of the disease. If during the spring months precipitation is high, temperature low, and number of rainy days excessive, the appearance of acute symptoms, more particularly those involving the skin, is delayed.

B. *Symptomatology of* 1912 *Attacks.* A considerable amount of information has been collected in reference to symptomatology, but a discussion of this phase of the subject will not be undertaken until we have followed these cases through their 1913 recurrences.

The following general statements are warranted: While three or four years ago it was quite the usual thing to see patients showing a combination of severe skin lesions, severe stomatitis, intractable diarrhea or dysentery, mental derangement, and physical exhaustion, comparatively few patients exhibiting this symptomatology in a marked degree were observed in Spartanburg County during the summer of 1912. In many of the cases observed the symptoms were quite mild, and frequently they were confined almost entirely to the cutaneous system. This apparent indication of a decreasing virulence of the disease is strengthened by certain facts which appear in the study of mortality rates of pellagra in Spartanburg County for 1912 and earlier years.

XIV. CLINICAL OBSERVATIONS UPON ECONOMIC STATUS AND PREVIOUS HEALTH OF PELLAGRINS. It is believed by many who are brought into contact with pellagra that predisposition plays an important part in its development and that the disease most frequently affects the poorer classes, who live under unfavorable hygienic conditions and who subsist on a diet of low nutritive value and of limited variety. Some detailed studies were undertaken covering these points. The general hygienic conditions and dietary will be discussed elsewhere, and this section will be confined to a consideration of financial circumstances and health conditions as possible predisposing factors.

A. *Economic or Financial Circumstances.* In recording the data relating to the economic conditions under which the patients lived, the following classification was adopted: squalor, poverty, necessities, comfort, affluence. These terms are somewhat arbitrary and necessitate some brief explanation.

Squalor. Cases so classified are confined to those living in wooden huts in poor repair and without out-houses. Their diet was extremely poor and without variety, living rooms squalid, clothing filthy and in rags.

Poverty. Cases of this class lived in cabins usually without out-houses, rather isolated, ordinarily on large plantations. Food consisted largely of bacon, molasses, corn-bread, and biscuit. Negroes of the poorer tenant class form this group very largely.

Necessities. This class included those instances in which the family had a fairly regular cash income sufficient to provide for actual needs. It is made up largely of mill operatives and their families. They live in cottages, with some land about them, but rather closely aggregated to form mill-villages.

Comfort. Cases classified in this group are made up largely of farmers who own their own plantations and stock, have a good diet, and are in comfortable financial circumstances.

Affluence. In this group are included patients who live under the best of hygienic and financial conditions. Their houses are well-constructed, usually screened, and their diet is well balanced.

The cases so classified number 277 and are divided as follows:

Squalor	2
Poverty	28
Necessities	200
Comfort	41
Affluence	6

It will be seen that in 83 per cent. of the cases (squalor, poverty, necessities) the economical conditions were poor; that in 15 per cent. (comfort) the economical conditions were within the average, and in 2 per cent. (affluence) the financial circumstances were well above the average.

In connection with the "affluence" group, it may be said that the members of the Commission have personal knowledge of a number of other instances in which pellagra has developed in persons living under the best of hygienic and economic conditions.

Grouping the cases under two general subdivisions, we find that in 83 per cent. of the cases the economic conditions are poor, while in 17 per cent. they are good.

B. *Diseases of Childhood and General Health in Childhood. Diseases of Childhood.* In considering the diseases of childhood the cases were divided in two groups: (1) those giving a history of one or more of the following diseases: measles, mumps, chickenpox,

and whooping cough; (2) those giving a negative history for the diseases of childhood. The data covered 270 cases.

DISEASES OF CHILDHOOD.

Cases giving a history of one or more of the following diseases of childhood: measles, mumps, whooping cough, and chickenpox	252
No history of diseases of childhood	18
Total	270

As permanent injury to the heart and kidneys not infrequently follows attacks of scarlet fever, this disease was considered separately. In 20 cases a history of scarlet fever was elicited.

General Health in Childhood. The classification adopted in the consideration of general health in childhood was the following: Good, fair, and poor. Inquiries covering this point were made in 270 cases. Of this number, 232 (86 per cent.) gave a history of good health during childhood; in 28 cases it was fair, and in 10 cases it was poor.

C. *Diseases of Adult Life and General Health during Adult Life. Diseases of Adult Life.* The total number of cases considered is 198. The diseases peculiar to female adult life will be considered in a separate table. The following summary shows the prevailing diseases in some detail:

	No. of cases.
Gastric disturbance	14
Dysentery, acute or chronic	28
Typhoid fever	46
Tuberculosis	7
Other diseases, unclassified	36
No history of ill health	67
Total	198

An analysis of diseases of adult life shows that 34 per cent. (67) of the total number of cases gave no history of ill-health. In 25 per cent. of the cases, those giving history of gastric disturbances, dysentery, and tuberculosis, a chronic disease was present.

General Health in Adult Life. In considering this point the classification adopted was that of good health, fair health, and poor health.

GENERAL HEALTH DURING ADULT LIFE.

Good	134
Fair	66
Poor	18
Total	218

An analysis of the data concerning general health conditions during adult life shows a history of good health in 62 per cent., fair health in 30 per cent., and poor health in 8 per cent.

D. *Obstetrical and Gynecological History.*

Social Status.

Married	150
Widowed	9
Single	25
	184

Obstetrical History.

Married females who have borne children	136
Unmarried females who have borne children	2
Married females who have not borne children	23
Unmarried females who have not borne children	23
	184

Number of females who have borne 1 child	28
Number of females who have borne 2 children	20
Number of females who have borne 3 children	21
Number of females who have borne 4 children	25
Number of females who have borne 5 children	16
Number of females who have borne 6 children	8
Number of females who have borne 7 children	10
Number of females who have borne 8 children	4
Number of females who have borne 9 children	3
Number of females who have borne 10 children	1
Number of females who have borne 11 children	2
	138

Average number of children borne = 3.8.

Menstruation during Period of Acute Pellagrous Symptoms.

Normal	95
Irregular	53
Excessive	6
Suppressed	10
Menopause	11
No information	9
	184

Diseases of Women.

Number of females giving more or less definite history of ovarian, uterine, or other pelvic disease	49

From this summary it will be noted that among the females who had attained the age of puberty, 86 per cent. of the cases occurred in married women, and that 86 per cent. of these married women had borne children. The greatest number of children borne by an individual is 11. The average number borne is 3.8. We have collected some statistical information in reference to the average size of families in mill-villages in Spartanburg County, from the standpoint of children borne by each woman, and it is not significantly different from the average number shown among pellagrous women.

The amount of time at our disposal and the relative importance of the subject did not warrant examinations of sufficient thoroughness to classify in detail the diseases of women. Of the 49 cases

giving history of such diseases the following were noted: tubal and ovarian inflammation, pus-tubes, cystic ovary, endometritis, uterine fibroid, carcinoma of the uterus, displacement of the uterus, and pelvic inflammation. In a number of cases, symptoms referable to the genital tract were quite indefinite.

The feature of most interest and relative importance in the consideration of predisposing factors is the chronologic relationship of previous illness to the development of pellagrous symptoms. The following summary gives in some deatil the information secured:

RECENT ILLNESS POSSIBLY PREDISPOSING TO PELLAGRA.

Gastric disturbance (including chronic gastric indigestion)	15
Dysentery (chronic during summer)	23
Diarrhea	6
Hookworm disease (moderate infection)	1
Ovarian cyst (large)	1
Uterine disease	4
General poor health (usually following childbirth)	30
Nephritis	3
Ascites (probably due to nephritis)	1
Valvular disease of the heart	1
Asthma	1
Pulmonary tuberculosis	7
Malarial fever	1
Alcoholism	1
Morphine habit	1
Infantile paralysis	1
Whooping cough	2
Measles	12
Chickenpox	1
No history of recent illness, 156 Health better than usual, 2	158
	270

In 15 of the cases a history of chronic indigestion was obtained. In explanation of these cases it may be said that symptoms of gastric disturbance preceded the active cutaneous symptoms of pellagra by a period of several months to several years. In 11 per cent. (30) of the cases no history of illness immediately preceding the development of pellagra could be obtained other than the fact that the general health was poor. Quite frequently this history of poor health followed confinement. One history of hookworm disease is included. This case showed objective clinical evidence of hookworm infection, which was uncommon for Spartanburg County. Malarial fever does not appear to be endemic in this county, and the one case included in this table was contracted in one of the "low country" counties. We were impressed with the fact that children not infrequently contracted pellagra during convalescence from acute infectious diseases, or very soon thereafter. It will be noted that 15 such observations were made: whooping cough, 2; measles, 12; chickenpox, 1. Of the 43 cases in children under ten years of age, 11 (approximately 23 per cent.) gave a

history of measles. In most of these the attack of pellagra occurred soon after recovery from measles.

SUMMARY. In the large majority of these cases (83 per cent.) economic conditions were poor, and the disease is most prevalent among people of insufficient means. We would, however, invite attention to the fact that 17 per cent. of these cases occurred in patients living in comfortable circumstances. This is not in agreement with Italian conceptions of the disease, where it presumably is confined altogether to the poorer element of the general population.

An analysis of general health conditions during childhood shows that in 86 per cent. of the cases the history was that of good health. So-called congenital diseases and inherited constitutional defects were of no apparent significance.

An analysis of diseases of adult life shows that in 25 per cent. of the cases, those giving a history of gastric disturbances, dysentery, and tuberculosis, a chronic disease was present, and it might be inferred that there is evidence of existing predisposition. During adult life the general health conditions were good in more than half the cases (62 per cent.).

An analysis of the obstetrical and gynecological data shows that among females who had reached the age of puberty, those most affected were married women (86 per cent.). As 86 per cent. of the married women had borne children and the average number of children borne was 3.8, it might be inferred that childbearing is an important predisposing factor. We know, however, that the average number of children borne by married women in the general population of the South is equal to or even greater than this.

Recent illnesses do appear to be worthy of serious consideration as predisposing factors, and it is our opinion that they frequently do influence not only the development of pellagra but also the severity of the attacks. It will be noted, however, that 59 per cent. of the cases in this series gave no history of illness immediately preceding the development of pellagra.

XV. STUDIES UPON HYGIENIC AND SANITARY CONDITIONS OF HOUSES AND PREMISES. A. *Houses.* The prevailing type of home in this county is a frame dwelling. The site usually is well drained, and there is always more than sufficient space between houses to afford free circulation of air.

In this study the dwelling houses are considered in three groups: brick, frame, and cabin.

Brick Dwellings. Dwellings of brick construction are relatively few in number. The mercantile houses in the larger centres are usually of brick construction, one or more stories in height, and the upper stories occasionally are used for living quarters. One of the cases included in this series was occupyiug such quarters.

Frame Dwellings. The mill-village dwellings are of the same general type, usually one story, sometimes two (Figs. 1, 2, 3, and 4).

The houses are almost always double. The single-story houses consist of a combination sitting and bed room, dining room, and

FIG. 1.—Typical mill-village house.

FIG. 2.—Typical mill-village house.

kitchen (Fig. 5). In the two-story houses there is in addition a bed room on the second floor. Small families occupy one-half

of a double single-story house, and large families live in either a two-story house or both sides of a double one-story house. There are two or three windows in each room and a small porch in front. These houses have no cellar, the foundation is brick, the ground floor is well above the ground, and the space between the ground

FIG. 3.—Typical mill-village house

FIG. 4.—Typical mill-village house.

and ground floor is left open, permitting free circulation of air. Doors are placed directly in line from front to rear of the house, permitting free and unobstructed passage of fresh air. Rooms are sealed, both walls and ceiling. The timber used for this purpose is sometimes matched, sometimes not. The roof has a good pitch

with a large attic, permitting circulation of air, and the bed rooms have open fireplaces which further improve ventilation.

These houses are practically all infested with *Cimex*, and the grooves between the boards used in sealing the rooms afford an ideal place for the hatching out of broods of these insects.

FIG. 5.—Interior view, mill-village house.

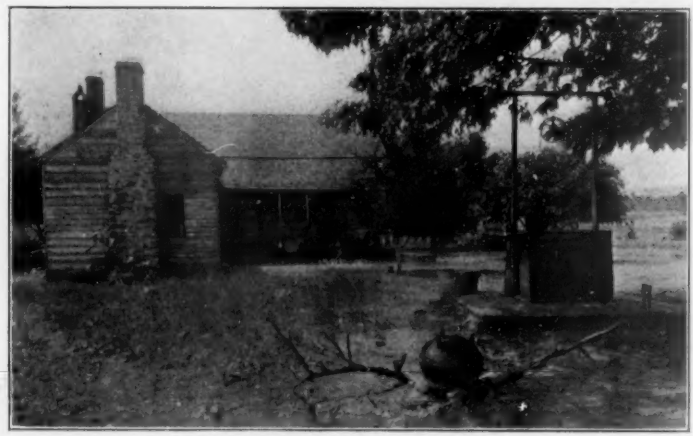

FIG. 6.—Type of farm-house and well.

The dwelling houses in the farming section are practically always frame houses (Fig. 6). Many of the farm-houses, more particularly

those occupied by owners, are well-constructed, roomy, and superior to the mill-village dwelling-house. On the other hand the usual tenant-house is inferior in many respects to that found in mill-villages.

Cabins. In this group are included the small frame or log dwellings, poorly constructed and ill-ventilated (Fig. 7). The negroes of the farming class usually occupy such houses.

FIG. 7.—Type of cabin occupied by negro tenants on farms.

HYGIENIC AND SANITARY CONDITION OF HOUSES.

Brick		2
Frame		236
Cabin		19
		257
Repair:	Good	212
	Poor	38
		250
Screened:	Yes	21
	No	229
		250
Ventilation:	Good	155
	Fair	86
	Poor	8
		249
General cleanliness:	Good	142
	Fair	92
	Poor	12
		246

SUMMARY. 92 per cent. of the cases lived in frame houses of fairly good size, and 85 per cent. of the houses investigated were in fairly good repair. Nine per cent. of the houses were screened, but in many instances the screening was more or less unsatisfactory. In only a small proportion of the screened houses did the screening afford satisfactory protection against the ingress of insects. Musca domestica was present in all, and Stomoxys calcitrans was present in many unprotected houses.

Ventilation. In 62 per cent. of the houses investigated, ventilation of the bed rooms was good, in 36 per cent. only fair, and in 3 per cent. poor. The number of persons occupying each bedroom averaged about three, and the available allowance of air space did not, in general, suggest overcrowding. Poor ventilation and overcrowded conditions were more in evidence in the negro population.

SUMMARY. We have failed to find anything of significance in connection with the houses from the standpoint of overcrowding and ventilation. It was observed that Musca domestica was always more or less abundant, and that of the blood-sucking insects, Stomoxys calcitrans and Cimex lectularius were of common occurrence. A detailed study of the observations on insects will be considered in the entomological section of this report.

B. *Water Supply.* The sources of water supply for drinking purposes among the general population of Spartanburg County are similar to those considered in this study. For analytical purposes the sources of supply are divided into three groups, wells, springs, and city water.

SOURCE OF WATER SUPPLY.

Wells: Dug well, with bucket	162		
Artesian well, with pump	30	192	
Springs	13	13	
City water, hydrant	36	36	241

PROTECTION OF WATER-SUPPLY WITH REFERENCE TO CONTAMINATION BY SURFACE WATER OR BY SEEPAGE AT POINT FROM WHICH SUPPLY IS DRAWN.

Protection satisfactory (water-supply drawn from hydrants, from artesian wells with concrete base, or from deep wells with concrete base)	65
Partly protected (water-supply drawn from wells with wooden base, either covered or uncovered, or from isolated springs)	176
	241

Wells. The wells are of several types. The type most common in rural districts and in some of the mill-villages is the ordinary dug well, about five feet in diameter (sometimes round and sometimes square), from thirty to sixty or more feet in depth, and protected at the top by a wooden frame. Though a few wells could be classified as "shallow wells," it was quite the usual thing to

FIG. 8.—Typical dug well with bucket. Wooden base.

FIG. 9.—Type of driven pump well, wooden base.

find that the supply was obtained from a sufficient depth to insure that an impermeable stratum supervened, preventing contamination by surface water.

FIG. 10.—Type of bucket well, wooden base

FIG. 11.—Type of driven well with pump. Sloping concrete base.

The water was usually drawn by means of the well-known bucket and windlass arrangement, but in a number of instances pumps were

in use. In the farming districts, ordinarily, no effort was made to guard against contamination at the immediate source of supply, but in some of the mill-villages these wells have concrete bases, sloping outward. The various types of wells can be better understood by reference to Figs. 8, 9, 10, 11, and 12.

In some of the mill-villages, artesian wells are in use. These artesian wells are usually quite deep, and the water is drawn by pump.

FIG. 12.—Dug well with bucket. Concrete base.

Springs. The use of spring water was, with one or two exceptions, confined strictly to the farming population living in comparative isolation. Usually drainage from the house was not in the direction of the spring, and the possibility of contamination was not a factor of importance.

City Water. This source of supply was confined to the city of Spartanburg. Bacteriological and chemical examinations are made from time to time, with no evidence of contamination.

SUMMARY. It will be noted that 80 per cent. of the cases used well water; 15 per cent. used city water; and 5 per cent. used spring water.

In 27 per cent. of the total observations (241) the water supply was perfectly protected from contamination. The remaining 73 per cent. are classified as partly protected, but this group requires some further explanation, as otherwise an erroneous inference might be drawn. We have included in this group all springs, all shallow wells, and all wells without a concrete base. As a matter

of fact, there were few shallow wells, and the probability of contamination in this group, considered as a whole, was but slight.

We realize that the water-supply is not considered to be of any importance as a factor in the etiology of pellagra. In this study, however, we have endeavored to investigate, as far as was possible, all probable factors concerned in the epidemiology of the disease, and for this reason have considered the water-supply. We have found nothing of any apparent significance in this connection.

C. *Disposal of Excreta.* In making a general survey of sanitary conditions, a study of the disposal of excreta was included. In classifying privy types we have adopted, for the sake of convenience, the classification used by the Rockefeller Sanitary Commission in its hookworm investigations in the Southern States.

INDEX OF PRIVY TYPES ADOPTED BY THE ROCKEFELLER SANITARY COMMISSION.

		Per cent.
Class A.	Water carriage or Marine Hospital Barrel (L. R. S.)	100
Class B.	Water-tight and rigidly fly-proof privy	75
Class C.	Water-tight, closed-in back	50
Class D.	Closed-in back, surface privy	25
Class E.	Ordinary open-in-back surface privy	10
Class F.	No privy	00

We encountered in this study one type of privy not falling strictly in any of these groups. The type in question (Fig. 14) was found in three or four of the mill-villages, and consisted of an out-house open in front and behind. The excreta were collected in square metal pails, supposedly water-tight. These pails were emptied at intervals. No attempt was made to keep out flies, the pails were frequently battered, and not water-tight, and usually were extremely filthy. It was not possible to include these privies in Class C, nor was it fair to put them in Class E. We have therefore placed them in Class D.

The following tables will show the facts observed:

PRIVY TYPES.

Class A	11
Class B	0
Class C	0
Class D	51
Class E	152
Class F	29
Total	243

SANITARY INDEX FOR ALL PRIVIES.

Class A.	11 at 100 per cent.	1100
Class B.	00 at 75 per cent.	00
Class C.	00 at 50 per cent.	00
Class D.	51 at 25 per cent.	1275
Class E.	152 at 10 per cent.	1520
Class F.	29 at 0 per cent.	00
Total		3895

Sanitary index = 16.

DISTANCE OF PRIVY FROM HOUSE.

10 yards	4
15 yards	9
20 yards	35
25 yards	25
30 yards	75
35 yards	4
40 yards	9
45 yards	1
50 yards	31
60 yards	2
70 yards	1
75 yards	1
100 yards	2
200 yards	1
Water-carriage system (Class A)	11
No privy (Class F)	29
Total	240

DISTANCE OF PRIVY FROM WELL.

10 yards	5
15 yards	5
20 yards	13
25 yards	7
30 yards	27
35 yards	7
40 yards	12
50 yards	45
60 yards	5
70 yards	6
75 yards	9
80 yards	1
85 yards	1
100 yards	5
110 yards	1
250 yards	1
Water-carriage system (Class A)	11
No privy (Class F)	29
Total	190

The cases in which the disposal of excreta was by water carriage (5 per cent.) were confined to the city of Spartanburg. No privy of the Marine Hospital type (L. R. S.) was observed. Between 30 and 40 cases of pellagra developed in the city of Spartanburg in other than mill-village sections. Only 8 of these cases used a water-carriage system of disposal of excreta. There were no privies of Class B or C. In 21 per cent. the privies were arbitrarily included in Class D. In 63 per cent. of the cases the method of disposal was that of the unhygienic and insanitary open surface privy, and in 12 per cent. of the cases no privy was used.

The method of disposal of excreta in the mill-villages, located in Spartanburg County falls under two classes, D and E (Figs. 13, 14, 15, 16, and 17): In some villages the pail system is in use, but beneficial results are negatived by the fact that no effort is made to screen the closets properly either in front or behind. In other

villages the unhygienic open surface privy is in use, and flies have free access to large collections of excreta in close proximity to the dwelling-houses. In some mills the privies are cleaned weekly;

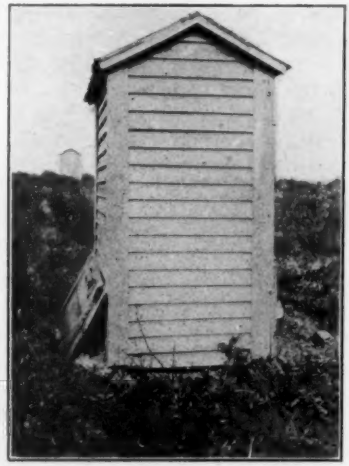

FIG. 13.—Privy, Type E. Surface, unscreened.

FIG. 14.—Privy, Type D. Pail system, unscreened.

in others, at greater and more irregular intervals. In some villages the sanitary condition around the privies is extremely poor, while in others some attempt is made to keep things relatively clean.

In the farming districts the methods of disposal fall in Classes E and F (Fig. 18). The open-surface privies on farms usually are

FIG. 15.—Privy, Type E. Surface, unscreened.

FIG. 16.—Privy, Type E. Surface, unscreened

poorly constructed and filthy, and the excreta are seldom removed, poultry being relied upon as scavengers. Negroes in the farming

FIG. 17.—Privy, Type E. Surface, unscreened.

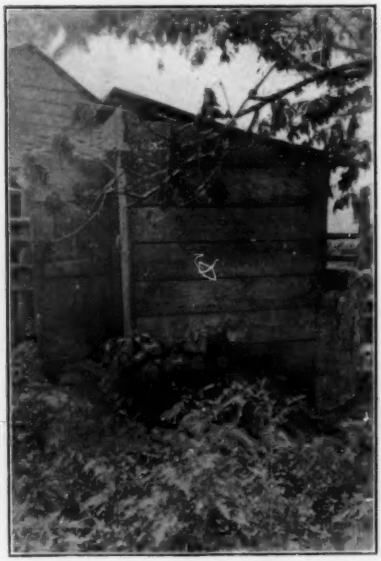

FIG. 18.—Privy, Type E. Surface, unscreened, on farm.

districts seldom have privies, and we were greatly surprised to find that farmers of the better classes sometimes had no privies.

The methods of disposal of excreta observed by us among the families of pellagrins in the different groups of the population are similar to the methods of disposal adopted by the general population in these groups.

Many of the mill authorities are well aware of the importance of good sanitation, and it is their constant endeavor to improve conditions. Even now plans are under way for the installation of a water-carriage system of disposal in one or two of the larger and better mills.

SUMMARY. The average general sanitary index for all the privies studied is only 16, on a basis of 100 for perfect disposal. So far as population groups are concerned the methods of disposal in use by the general population are not different from those observed among pellagrous families. Between 30 and 40 cases of pellagra developed in the city of Spartanburg more or less away from mill districts, and only 8 of these cases used a water-carriage system of sewage disposal. In general the methods of disposal of excreta observed in this series are insanitary, and many of the diseases of the intestinal canal transferred by mechanical means, flies, etc., would find conditions most favorable for such transfer.

D. *Premises.* The following table covers the observations made relative to the sanitary conditions of the premises of pellagrins:

LOCATION OF HOUSE RELATIVE TO MOISTURE AND DAMPNESS.

Air and soil:	Dry		242
	Damp		6—248
Drainage:	Good		242
	Poor		6—248
General cleanliness of premises:		Good	146
		Fair	90
		Poor	12—248
Stagnant water:	Yes		7
	No		239—246
Shade:	None		145
	Little		62
	Much		38—245
Undergrowth or shrubbery:		None	207
		Little	36
		Much	2—245
Barns:	Number of houses having barns		90
	Number of houses having no barns		145—235
Animal:[15]	Dogs		76
	Cats		79
	Horses or mules		54
	Cows		93
	Goats		6
	Fowl		158
	Rats		88
	Mice		124

[15] Number of observations, 237.

SUMMARY. In 98 per cent. of the cases the dwelling-houses were well located and the drainage was good. Stagnant water was noted on the premises in only 3 per cent. of the houses investigated (246). But few mosquitoes were observed. The entomological section of this report will deal with permanent streams and collections of water, with the blood-sucking insects breeding therein, and with other biting insects found in the houses, on the premises, and in the neighborhood.

XVI. GENERAL OBSERVATIONS UPON THE DIETARY. The data analyzed in this study are necessarily of a general nature, based on information obtained from statements of patients, physicians, storekeepers, millers, and others.

In order to determine the relative frequency with which the more important foodstuffs were used, patients and their families were closely questioned as to how often certain articles of food would appear upon the family table, and with regard to the patient's particular fondness for any particular dish. Replies to these questions were recorded under the following heads: Daily, one or more times a day; habitually, one or more times a week, but not daily; rarely, at irregular intervals of more than a week; never.

With a view to discovering any significant differences in the habitual dietary of the three groups in the population which show the greatest disparity in the prevalence of pellagra, the results of this inquiry are summarized for the rural population, urban population, and the mill-village population, separately. These results are set forth in the following tables, which represent the actual number of pellagrins and the percentage of the total number of pellagrins from whom the particular information in question was obtained.

TABLE XI.

FRESH MEATS:			Daily.	Habitually.	Rarely.	Never.
Fresh beef in season	Mill population	Number	1	51	84	11
		Per cent.	1	35	57	7
	Urban population	Number	3	27	16	0
		Per cent.	7	59	34	0
	Rural population	Number	2	20	40	12
		Per cent.	3	27	54	16
Fresh pork in season	Mill population	Number	9	68	60	10
		Per cent.	6	46	41	7
	Urban population	Number	1	33	12	0
		Per cent.	2	72	26	0
	Rural population	Number	4	45	18	5
		Per cent.	5	63	25	7
Fresh fish in season	Mill population	Number	0	32	79	34
		Per cent.	0	22	55	23
	Urban population	Number	0	14	29	2
		Per cent.	0	31	64	5
	Rural population	Number	0	7	44	21
		Per cent.	0	10	61	29

TABLE XI.—Continued.

			Daily.	Habitually.	Rarely.	Never.
FRESH MEATS:						
Fresh fowl in season	Mill population	Number	1	59	81	6
		Per cent.	1	40	55	4
	Urban population	Number	1	30	14	2
		Per cent.	2	64	30	4
	Rural population	Number	2	45	23	2
		Per cent.	3	62	32	3
CURED MEATS:						
Cured beef	Mill population	Number	1	0	25	94
		Per cent.	1	0	21	78
	Urban population	Number	0	1	10	26
		Per cent.	0	3	27	70
	Rural population	Number	0	1	3	66
		Per cent.	0	1	4	95
Cured pork	Mill population	Number	92	40	10	2
		Per cent.	64	28	7	1
	Urban population	Number	25	9	9	2
		Per cent.	56	20	20	4
	Rural population	Number	49	12	8	1
		Per cent.	70	17	12	1
Cured fish	Mill population	Number	1	6	45	95
		Per cent.	1	4	31	64
	Urban population	Number	1	5	15	22
		Per cent.	2	12	35	51
	Rural population	Number	1	3	14	53
		Per cent.	1	4	20	75
Canned beef	Mill population	Number	0	14	80	51
		Per cent.	0	10	55	35
	Urban population	Number	0	3	20	20
		Per cent.	0	7	47	46
	Rural population	Number	0	2	25	46
		Per cent.	0	3	34	63
Canned pork	Mill population	Number	0	7	39	88
		Per cent.	0	5	29	66
	Urban population	Number	0	2	14	24
		Per cent.	0	5	35	60
	Rural population	Number	0	1	7	58
		Per cent.	0	2	11	87
Canned fish	Mill population	Number	0	20	90	30
		Per cent.	0	14	64	22
	Urban population	Number	1	7	28	8
		Per cent.	2	16	64	18
	Rural population	Number	0	5	38	29
		Per cent.	0	7	53	40
EGGS, BUTTER, AND MILK:						
Eggs	Mill population	Number	10	36	13	2
		Per cent.	16	59	22	3
	Urban population	Number	7	8	0	0
		Per cent.	47	53	0	0
	Rural population	Number	11	12	17	3
		Per cent.	25	28	40	7
Butter	Mill population	Number	114	16	12	4
		Per cent.	78	11	8	3
	Urban population	Number	33	6	8	0
		Per cent.	70	13	17	0
	Rural population	Number	51	8	9	6
		Per cent.	69	11	12	8
Milk	Mill population	Number	83	21	29	12
		Per cent.	57	15	20	8
	Urban population	Number	16	14	16	9
		Per cent.	29	25	29	17
	Rural population	Number	41	15	18	9
		Per cent.	49	18	22	11

TABLE XI.—Continued.

VEGETABLES, FLOUR, LARD:			Daily.	Habitually.	Rarely.	Never.
Fresh vegetables in season	Mill population	Number	120	21	3	3
		Per cent.	82	14	2	2
	Urban population	Number	36	6	4	0
		Per cent.	78	13	9	0
	Rural population	Number	61	11	1	0
		Per cent.	84	15	1	0
Canned vegetables	Mill population	Number	4	41	70	29
		Per cent.	3	28	49	20
	Urban population	Number	2	17	25	2
		Per cent.	4	37	54	5
	Rural population	Number	3	8	25	37
		Per cent.	4	11	34	51
Wheat flour	Mill population	Number	142	1	0	0
		Per cent.	99	1	0	0
	Urban population	Number	45	0	0	0
		Per cent.	10	0	0	0
	Rural population	Number	71	1	0	0
		Per cent.	99	1	0	0
Leaf lard (pork)	Mill population	Number	30	16	2	0
		Per cent.	62	34	4	0
	Urban population	Number	10	2	0	0
		Per cent.	83	17	0	0
	Rural population	Number	28	4	0	0
		Per cent.	87	13	0	0
Compound lard	Mill population	Number	101	2	23	5
		Per cent.	77	2	18	3
	Urban population	Number	37	5	2	1
		Per cent.	82	11	5	2
	Rural population	Number	62	1	7	1
		Per cent.	87	1	10	2

TABLE XII.

CORN PRODUCTS. CORN MEAL USED.

		Daily.	Habitually.	Rarely.	Never.
Mill population	Number	85	21	40	0
	Per cent.	58	14	28	0
Urban population	Number	23	12	10	2
	Per cent.	49	26	21	4
Rural population	Number	47	13	11	0
	Per cent.	66	18	16	0

SOURCE OF SUPPLY OF MEAL. SHIPPED MEAL GROUND IN NEARBY STATE

		Exclusively.	Mostly.	Rarely.	Never.
Mill population	Number	84	8	22	4
	Per cent.	71	7	19	3
Urban population	Number	29	2	5	1
	Per cent.	78	5	14	3
Rural population	Number	16	9	13	4
	Per cent.	38	21	31	10

LOCAL CORN GROUND LOCALLY.

		Exclusively.	Mostly.	Rarely.	Never.
Mill population	Number	30	22	2	0
	Per cent.	56	40	4	0
Urban population	Number	7	7	0	0
	Per cent.	50	50	0	0
Rural population	Number	32	19	4	0
	Per cent.	58	35	7	0

TABLE XII.—Continued.

QUALITY OF MEAL.

		Good.	Musty.
Mill population	Number	41	49
Urban population	Number	13	12
Rural population	Number	34	18

USE OF HOMINY OF GRITS.

		Daily.	Habitually.	Rarely.	Never.
Mill population	Number	9	47	53	19
	Per cent.	7	37	41	15
Urban population	Number	9	16	7	5
	Per cent.	24	43	19	14
Rural population	Number	5	14	23	11
	Per cent.	10	26	43	21

		Syrup.	Corn-starch.	Whisky.
Mill population	Number	47	5	19
	Per cent.			
Urban population	Number	23	5	9
	Per cent.			
Rural population	Number	27	3	6
	Per cent.			

Meats. The following meats were used to a greater or less extent in these three subdivisions of the population: fresh meat, fresh pork in season, fresh fish in season, fresh fowl, dried or chipped beef, bacon, cured fish, canned beef, canned sausages, and canned salmon. Fresh beef is not a staple article of diet of any of these population groups during the summer months. By far the greater number of individuals among the mill-village and rural population groups used it but rarely, and some never, while the urban group used it more extensively. The actual percentages of those eating fresh meat, either rarely or never, are as follows: Rural cases, 70 per cent.; mill-village cases, 64 per cent.; urban cases, 34 per cent. Fresh pork in season was used approximately equally in the three groups, but rather more generally in the rural group, the actual percentages of those using it daily or habitually being as follows:

Urban cases, 74 per cent.; rural cases, 68 per cent.; mill-village cases, 52 per cent.

Fresh fish is not a common article of diet in Spartanburg County, and was but rarely used in any of the three groups. This statement applies more particularly to the mill-village and rural population. The percentages of those using fresh fish either rarely or never are as follows: urban cases, 59 per cent.; rural cases, 90 per cent.; mill-village cases, 78 per cent.

Fresh fowl was used quite extensively in all three groups particularly during the summer months; most extensively by the rural

cases; less so by the urban group, and least extensively by the mill-village group. The actual percentages of those using fowl, either daily or habitually, are as follows: urban cases, 66 per cent.; rural cases, 65 per cent.; mill-village cases, 41 per cent.

Cured beef is used but rarely in any of the three groups. In 95 per cent. of the rural group, 78 per cent. of the mill-village group, and in 70 per cent. of the urban group it was never used.

Bacon (cured pork) is a common article of diet in all groups, being used either daily or habitually by 92 per cent. of the mill-village group, 87 per cent. of the rural group, and 76 per cent. of the urban group.

Cured fish is little used in any of the three groups, though somewhat more frequently in the city population than by the the other two classes.

Canned beef is not used extensively. In 63 per cent. of the rural cases, 46 per cent. of the urban cases, and 35 per cent. of the mill-village cases it is never used. When used it appears to be eaten neither daily nor habitually.

Canned sausages (pork) are quite extensively used although seldom with any great frequency or regularity. The farming population uses them least.

Canned Fish. Canned salmon, while quite generally used, is not a staple article of diet in any of the groups. In 93 per cent. of the rural cases, 86 per cent. of the mill-village cases, and 82 per cent. of the urban cases it is rarely or never used.

Eggs, Butter, and Milk. These farm and dairy products are used with great frequency and regularity in all three groups of the population. Eggs were used either daily or habitually by 100 per cent. of the urban cases, 75 per cent. of the mill-village cases, and 53 per cent. of the rural cases. Butter was used daily or habitually by 89 per cent. of the mill-village cases, 83 per cent. of the urban cases, and 80 per cent. of the rural cases. Milk was used either daily or habitually by 72 per cent. of the mill-village cases, 67 per cent. of the rural cases, and 54 per cent. of the urban cases. The use of eggs and butter is not so common in the rural group as in the other two. It must be remembered, however, that a greater number of negroes are included in this group, and their diet is probably below that of the whites, more particularly from the standpoint of variety. For example, Table XI shows that in 3 cases among the rural population, eggs were never used; 2 of these cases were negroes. Of 6 cases that never used milk, 3 were negroes. Our data are not sufficiently extensive to draw a careful comparison between the average dietary of whites and negroes at the present time. Further information on this subject will be sought the coming season.

Vegetables. Fresh vegetables were used in season, to a very large extent, by all the groups. They were used either daily or habitually

by 99 per cent. of the rural cases, by 96 per cent. of the mill-village cases, and by 91 per cent. of the urban cases. Among the vegetables most commonly used may be mentioned cabbages, green corn, beans, potatoes (Irish and sweet), peas, tomatoes, and squash. During the winter months the available vegetables were confined largely to Irish potatoes, cabbage, peas, and beans. Canned vegetables were seldom used habitually. In 85 per cent. of the rural cases, 69 per cent. of the mill-village cases, and 59 per cent. of the urban cases they were either rarely or never used.

The lards used consisted of pure leaf lard, the compound lards, and pure vegetable (cotton-seed) lards. In 7 cases pure leaf (hog) lard was used exclusively. In many instances, particularly so in the rural cases, sufficient lard was rendered from the pork killed at home to supply all needs for from two to eight months of the year or longer. Others used compound or pure vegetable lards exclusively. Inquiry among 50 non-pellagrous families in one mill-village showed the use of compound lards to be quite as extensive as among pellagrins.

Some of the grocers catering to the well-to-do classes of the population in Spartanburg informed us that some customers preferred the pure leaf lard, while others preferred and used constantly the pure vegetable lards.

Wheat Flour. Bread made of wheat flour was used daily by 99 per cent. of the cases in each group, and was used habitually by the remaining 1 per cent.

Corn Products. Among the corn products used are included corn meal, hominy, grits, syrup, corn-starch, and whisky. Corn-meal is a staple article of diet in all classes of the population in the area studied. In this series, 84 per cent. of the rural cases, 75 per cent. of the urban cases, and 72 per cent. of the mill-village cases used corn-meal either daily or habitually. Two cases had not used corn-meal for a period of two years prior to the development of pellagra. These cases were two children whose mother had contracted pellagra in 1910, at which time she was advised by her physician to discontinue the use of corn products absolutely. She states that she had done so and that there had been no corn products in the house for the past two years. The children, aged six and thirteen years respectively, developed the disease in 1912.

The meal was obtained from different sources. Many of the families used no meal other than that grown locally and ground at a local mill; others used such meal the greater part of the time; others used, exclusively, meal shipped in from a near-by state; and still other used such meal the greater part of the time, but used more or less meal made from local corn, locally ground. The cases in which both local and shipped meal was used are included in both tables, which accounts for the apparent excess in numbers.

Some families raised sufficient corn to supply them with meal,

locally ground, for from six to eleven months of the year, the remainder being purchased from a grocer. The quality of the meal varied. When meal was made from the home-raised corn it was the usual custom to grind it up in small amounts at frequent intervals, and such meal was said to be fresh and sweet. The meal purchased from grocers was sometimes musty, but such meal usually was fed to the chickens. The use of hominy and grits was not so common in these groups as had been expected. Among the rural cases 64 per cent., the mill-villages cases 56 per cent., and the urban cases 33 per cent. rarely or never used either.

Comparative dietary studies on the normal non-pellagrous population under like conditions are desirable in any attempt to determine the possible influence of the dietary on the development of pellagra. We have made some comparative studies with this object in view, but our data are not sufficiently complete at this time to warrant any definite conclusions.

The diet to which most of these cases were accustomed is of fairly good variety, but it is probable that in many instances the methods of preparation and cooking of the food are subject to criticism. This matter likewise is to be made a subject of further investigation. We are quite certain, from personal observation, that the average dietary of the poorer classes of the population in the county studied is much superior both in its variety and actual nutritive value to the dietary of the peasants in the North of Italy. Another striking difference may be mentioned, namely, that corn-meal in the form of polenta constitutes the chief bread component of the diet of the peasant of Northern Italy, whereas in Spartanburg County, among all classes of the population, wheat flour, in the form of bread or biscuit, is the principal bread-stuff, and corn-meal, while extensively used, is not nearly so staple an element of the dietary as wheat flour.

XVII. Synopsis. The epidemiological study of pellagra as it exists in Spartanburg County, South Carolina, is still in progress and will be continued during the spring and summer of 1913. The work done in 1912 constituted a more or less general preliminary survey of the field, and the results of that work as set forth in this report are tentative and will be further tested by continued observations and study.

The results of the work in 1912 tend to strengthen the belief that a satisfactory knowledge of the epidemiology of pellagra is best to be gained by intensive studies, of the behavior of the disease in selected communities, and of the prevailing conditions which influence its local prevalence and distribution. It is hoped that a study conducted with sufficient care and thoroughness along these lines will yield valuable evidence either for or against the possible infectious nature of the disease and its possible communicability.

The epidemiological data presented in the present report are summarized below:

PART I. 1. Pellagra shows a striking inequality of distribution in the ten townships within the county, the township rate of prevalence per 10,000 of population varying from 0 to 71. The city of Spartanburg, with a population of 17,517 gave a rate of 49 per 10,000 against 34 per 10,000 for the remainder of the county.

2. Density of population while showing a tendency to conform to the relative prevalence of the disease does not alone offer an explanation of the geographical inequalities of its distribution within the county.

3. The cotton-mill-village population gives a rate of prevalence of 104 per 10,000 against 19 per 10,000 for the remainder of the county, and against 16 per 10,000 for the rural sections alone.

4. The variations in the rates of prevalence in the ten townships are in a measure proportional to the presence or absence of a large mill-village population. Excluding the mill-village population, there is still a marked discrepancy between the townships in the rural population alone, ranging from 0 to 29 cases per 10,000 of population. The excessive prevalence among the farming classes is found in the townships which have a relatively large mill-village population.

5. The white population of the county gives a prevalence of 45 cases per 10,000; the negro population a prevalence of 9.5 per 10,000. Excluding the mill-village population which is practically all white, the remaining white population still gives a rate of prevalence (25.2 per 10,000) over two and one-half times that among the negroes.

6. The rate of prevalence per 10,000 for males in the county is 17; for females, 50.5. White males give a rate of 22.95 per 10,000; white females, 87.5 per 10,000, negro males, 3.9 per 10,000; negro females, 14.9 per 10,000.

7. The rate of prevalence among children under ten years of age and among adults aged forty-five years and older is practically equal in the two sexes.

8. The rate of prevalence drops among males between the ages of nineteen and forty-five years, whereas for females there is a remarkable excess of prevalence between these ages.

9. In both males and females there is a striking fall in prevalence between the ages of ten and twenty years.

10. The most significant fact with regard to occupation is the excessive prevalence of pellagra among women employed in housework.

11. The excessive prevalence of pellagra in the mill-village population is found largely among women and children at home during the day. Among actual mill-workers the rate of prevalence between the two sexes appears to be about equal.

12. One-half of the cases occurred singly in one family; about one-fourth occurred two in one family; the remaining fourth occurred in groups of three, four, or five in one family. The question of the possible relative importance of family relationship and household association is still under investigation.

13. Among cases occurring singly in families, the proportion of children of both sexes under ten years of age is low and that of adult females excessively high. Among cases occurring two or more in one family the proportion of young children is proportionately high, especially among males.

PART II. 14. While apparently authentic sporadic cases of pellagra within the county can be traced back to as early as 1894, the disease does not appear to have occurred in any great number of cases in any year until 1908. Since 1908 the incidence-rate appears to have rapidly increased each year to 1911. The number of new cases developing in 1911 appears to have been slightly greater than in 1912.

15. There was no evidence pointing to any spring and fall recrudescence of the disease in the population so frequently referred to in the literature of pellagra. There is no particularly marked tendency for the seasonal recurrence to appear in an individual during the same month, year after year.

16. *Influence of Climate.* Climatic conditions appear to influence the development of symptoms of the disease. If during the spring months precipitation is high, temperature low, and number of rainy days excessive, the appearance of acute symptoms, more particularly those involving the skin, is delayed.

17. *Symptomotology.* It would appear that three or four years ago a large proportion of the cases observed in the county presented intestinal and nervous symptoms of great severity. In 1912, in many instances, symptoms were quite mild, and sometimes were confined almost exclusively to the cutaneous system, the disease appearing to be of a less virulent type in 1912 than in previous years.

18. *Economic Status.* In the majortiy of cases (83 per cent.) economic conditions are poor and the disease is most prevalent among people of insufficient means.

19. *Predisposing Diseases.* General health conditions in childhood do not appear to warrant consideration as etiological factors when the disease develops in adult life. In a number of cases the development of pellagrous symptoms in children was preceded by one of the acute exanthematous diseases of childhood. About one-fourth of the cases gave a history of a preceding chronic disease in adult life. In more than one-half of the cases (62 per cent.) the history was that of good health. Among adult females, those most affected were married women (86 per cent.), and 86 per cent. of the married women had borne children.

A history of illness immediately preceding the development of pellagra was elicited in 59 per cent. of the cases.

20. *Hygiene and Sanitation of Houses and Premises.* The most unsanitary condition found in the county is the absence of properly constructed privies. Outside of a part of the city of Spartanburg which is supplied by a water-carriage sewage system, there is no effective provision in the county for the proper disposal of human excreta. A second striking unsanitary condition is the almost complete absence of effective screening of dwellings.

These two conditions present a situation highly favorable to the transmission of disease organisms eliminated in the excreta, both by direct contamination of food and person and by insects. This situation is naturally aggravated in the mill-villages and small towns by the greater congestion of houses. The absence of effective screening for dwellings gives rise to conditions conducive to the possible transfer of diseases transmitted by biting insects.

21. *Dietary.* Observations upon the habitual use of the more common foodstuffs failed to discover any points of difference between pellagrins and non-pellagrins in the county or any facts which would seem to explain the strikingly greater prevalence of pellagra among certain classes of the population.

The most striking defect in the general dietary of the working classes, appears to be the limited use of fresh meats, the animal proteid being supplied largely in the form of cured meats, of which salt pork (especially bacon) is the most important.

Unhygienic preparation of food appears to be a probable important factor in the general health of the population.

Investigation of the kind, quantity, and qualtiy of corn and corn products used in the county failed to bring to light any epidemiological evidence pointing to the agency of corn as an etiological factor in the disease. The presence of two cases in our series giving a definite history of no corn consumption within two years prior to the onset of symptoms, together with several other cases in which corn products were eaten, if at all, only in small quantity and at extremely rare intervals, would seem to argue strongly against any hypothesis that corn products alone are the causative agent of the disease.

REVIEWS

MANUAL OF CHEMISTRY. A GUIDE TO LECTURES AND LABORATORY WORK FOR BEGINNERS IN CHEMISTRY. A TEXT-WORK SPECIALLY ADAPTED FOR STUDENTS OF MEDICINE, PHARMACY, AND DENTISTRY. By W. SIMON, PH.D., M.D., Professor of Chemistry in the College of Physicians and Surgeons of Baltimore and in the Baltimore College of Dental Surgery; Emeritus Professor in the Maryland College of Pharmacy, Department of the University of Maryland, and DANIEL BARE, PH.D., Professor of Chemistry in the Maryland College of Pharmacy, Department of the University of Maryland, and of Analytical Chemistry in the Department of Medicine, University of Maryland, Baltimore. Tenth edition, thoroughly revised, with 82 illustrations, 1 colored spectra plate and 8 colored plates representing 64 chemical reactions. Philadelphia: Lea & Febiger.

THE many editions through which Simon's *Manual of Chemistry* has passed, render somewhat superfluous on the reviewer's part more comment than is necessary to point out where the present edition differs from its predecessors. There may be honest difference of opinion as to the wisdom of attempting to compass within one volume, the subjects of Physical Chemistry, Inorganic Chemistry, Analytical Chemistry, Organic Chemistry, and Physiological Chemistry, but this difference evidently does not extend to those for whom the book is primarily intended. Ten editions of any work indicate its popularity with its chosen audience.

The authors have preserved in this the plan and characteristics of previous issues but have made many additions to the text, embracing such topics as exothermic and endothermic reactions; the theory of electrolytic dissociation and ionization, on which are based our present conceptions of the reactions of the body fluids; reversible reaction and chemical equilibrium; the chemistry of atoxyl, salvarsan, fluorescin, phenolsulphonephthalein, etc. In their own words the aim of the authors has been "to furnish the student in concise form a clear presentation of the science, an intelligent discussion of those substances which are of interest to him and a trustworthy guide to his work in the laboratory." In this they may fairly be said to have succeeded and many readers whose equipment in chemistry is rusty or has never

included the modern advances, will find here a simple and clear, if not complete, exposition of the subject.

The type is large and the wood cuts fulfil their purpose as illustrations. R. P.

SURGERY, ITS PRINCIPLES AND PRACTICE, BY VARIOUS AUTHORS. Edited by WILLIAM WILLIAMS KEEN, M.D., LL.D., Emeritus Professor of the Principles of Surgery and of Clinical Surgery, Jefferson Medical College, Philadelphia. Volume VI; pp. 1177; 519 illustrations. Philadelphia and London: W. B. Saunders Company, 1913.

THIS is a supplementary volume, designed to bring up to date the various chapters contained in the original five volumes of the work, which were published between 1906 and 1909. There are very few topics to which no additions have been made, owing to the rapid advance in surgical practice; and some entirely new subjects have presented themselves for discussion. Among the more important of the latter are Crile's principle of anoci-association, the surgery of the hypophysis, and modern thoracic surgery.

The most interesting additions to the principles of surgery are the explanation given by Adami of the value of poultices in favoring the pointing of an abscess, and his description of the use of cell proliferants, of Scharlach R., and of allantoin. In similar vein is Freeman's discussion of the treatment of abscesses by ferments and antiferments. Such matters as these remind us that progress occurs in the science as well as in the art of surgery.

T. Turner Thomas has prepared the supplementary chapter on surgical tuberculosis. He discusses the treatment with tuberculin, the uses of the formalin-glycerin solution, which should never be *less* (not more) than twenty-four hours old when used; and he makes brief but rather inadequate mention of tuberculous rheumatism. This, as well as the broader subject of inflammatory tuberculosis, merits wider attention than it has heretofore received outside of France.

In the supplementary chapter on Orthopedic Surgery it is very surprising to find that Lovett dismisses the bone transplantation for Pott's Disease (Albee) as a method still on trial, and that no mention whatever is made of one of the most revolutionary practices ever introduced into any department of surgery, namely, the Abbott treatment of scoliosis.

Dean D. Lewis and Kanavel contribute a chapter of fifty pages on the surgery of the hypophysis. Its comprehensiveness may be indicated by the statement that much of it is in small print, and that the bibliography alone covers three pages.

Owen supplements his original article on the surgery of the neck by giving the technique of operations for malignant disease in this region; but he does not commit himself as to whether or not the operation, when it involves the mouth, should be completed in one or in two sittings. He quotes Braun's experiences in performing some of these most radical operations under anesthesia by infiltration of the branches of the trigeminal nerve with cocaine; but he concludes that while Braun's essay is an attractive one, it is not altogether convincing to a surgeon like Owen himself who has a dread of the risks of cocain poisoning.

Murphy, like everyone else, is theoretically awake to the advantages of the transverse incision in the lateral regions of the abdominal wall. He mentions the contributions of both Rockey and Hesselgrave, but fails to credit J. W. Elliot, or G. G. Davis, or Chaput for their original work in this connection. And as appears by a recent number of Murphy's *Clinics*, Murphy himself adheres to the longitudinal incision which divides the motor nerves of the rectus muscle. Murphy pays particular attention in this supplementary chapter to the end-results of operations on the appendix, to the complications of appendicitis, and to intussusception, tuberculosis, actinomycosis, and malignant tumors of the appendix.

Dr. Hugh H. Young, in revising his chapter on the surgery of the prostate, lays special stress on the beneficial effects of preparatory treatment in reducing the postoperative mortality from renal complications, and claims unequalled value for the phenolsulphonephthalein test. It is noticeable, also, that he speaks with less contempt than formerly of the suprapubic operation.

Military and naval surgery are ably discussed by Borden and by Bell respectively. Both dwell on the education which is necessary before the average surgeon in civil life can be developed into a medical officer sufficiently competent to take charge of military or naval affairs, or public hygiene; and Borden especially points out the many and increasing advantages, scientific and material, which are open to a young physician who elects to adopt a military career.

New topics of absorbing interest, arthroplasty and transplantation of bone, are ably discussed by Warbasse; while Bickham, in his supplementary chapter on amputations gives admirable descriptions of methods of amputation for cinematic prosthesis. Unfortunately neither he nor Warbasse appear to speak from personal experience.

The volume closes with supplementary chapters on Plastic Surgery, by John B. Roberts; the Surgery of Accidents, by W. L. Estes; Surgery of the Infectious Diseases, by G. E. Armstrong; the X-rays in Surgery, by Codman; and includes moreover a discussion of various modern developments of the anesthetic problem, such as Anesthesia in differential pressure chambers, by Willy

Meyer; Anesthesia by Intratracheal Insufflation, by S. J. Meltzer; Intravenous Ether Anesthesia, by Kummel; and Spinal Anesthesia, by Houghton.

A complete index to the entire series of six volumes concludes this valuable and well nigh indispensable work. A. P. C. A.

TEXT-BOOK OF OPHTHALMOLOGY IN THE FORM OF CLINICAL LECTURES. By DR. PAUL ROEMER, Professor of Ophthalmology at Greifswald; Translated by Dr. Matthias Lanckton Foster, Member of the American Ophthalmological Society, etc. Volume II, pp. 294, 186 illustrations and 13 colored plates; Volume III, pp. 323, 186 illustrations and 13 colored plates. New York: Rebman Company.

THESE are the concluding volumes of this text book of ophthalmology. Volume II contains the chapters upon diseases of the lids, vitreous, sclera, lacrymal organs, and orbit, with chapters upon injuries, glaucoma, and concomitant strabismus. In volume III the affections of the chorioid, retina, and optic nerves, with chapters upon the pupil, pareses of ocular muscles, neurology and functional testing are taken up. An appendix by the translator with a complete index and list of authors concludes the work.

Common sense views pervade the whole. No fads are exploited. The semeiology is presented largely in the form of clinical histories.

As examples of the author's treatment of certain interesting portions of ophthalmology we may select the following as illustrations. Diseases of the orbit are very fully described; the various forms of orbital cellulitis are well set forth, particularly the part played in the etiology and symptoms by disease of the accessory sinuses of the nose. The differential diagnosis from affections of each of these sinuses is well presented. They are held to be responsible for more than 60 per cent. of all cases of inflammatory exophthalmos, hence the invariable rule to examine the accessory sinuses in every case of disease in the orbit—a rule which will lead to the saving of many eyes and the preservation of many lives. But while the nasal origin is thus fully insisted upon, the author takes the ground properly, that the treatment of the underlying sinusitis should be left to the rhinologist, though orbital abscesses must be freely evacuated in the interest of sight as well as of life. Extirpation of the lacrymal sac is declared to be the treatment of chronic catarrhal dacryocystitis. Probing is condemned; Toti's operation is not mentioned. The diseases of the lacrymal passages, epiphora, stricture, acute, and chronic inflammations of the sac are regarded only as individual links in a chain of diseases in which

the general practitioner by proper and timely treatment can take an active part.

Of sympathetic ophthalmia, which is still an interesting and important mystery in ocular pathology, an excellent summary of the views held by leading experimenters is given. There are (1) the migration hypothesis of Leber and Deutschmann; (2) the modified cilioneural hypothesis of Schmidt-Rimpler, and (3) the metastasis view of Berlin and the author. The first assumes the migration of a virulent agent, staphylococcus or other, from the first to the second eye by way of the optic nerve—a view which does not appear consistent with all the phenomena of the disease. Schmidt-Rimpler's hypothesis that irritation of the ciliary nerves in the eye first affected induces a susceptibility in the other through a reflex disturbance, is likewise rejected. Panas' addition to this obscure conception that general toxic influences, such as alcoholism, catarrhal disease of the nose and throat, etc., are predisposing factors, is not regarded as adding strength to the hypothesis. From all the known facts, the author concludes that the only hypothesis yet presented which is also consistent with experiment, is that sympathetic irido-cylitis originates hematogenously just the same as spontaneous irido-cyclitis, and is due to a specific metastasis from the eye first diseased by an agent yet unknown, which is dangerous to the eye only and not to the other organs. It is obvious that prophylactic treatment will be largely influenced by the surgeon's view as to the pathogeny of the affection.

After detailing the changes usually found in persistent glaucoma and tracing the clinical symptoms to the hypertension, the statement is made that the origin of the latter has not yet been explained, although gain is derived from the knowledge acquired in regard to treatment. Of the three cardinal symptoms in the glaucomatous eye, the changes in the bloodvessels, the cupping of the disk, and the alterations in the filtration angle, the latter alone is amenable to treatment, in that miotics or operations shall free this angle. Of iridectomy the author believes that he states the conviction of soberly thinking ophthalmologists, that while the operation delays the glaucomatous process, it does not permanently cure it; indeed, he advises that miotics should always be tried first whatever the form of disease present. The newer operations such as cyclodialysis and sclerectomy are fairly presented. The origin and outlet of the intra-ocular fluids with the effect of the same and other influences upon the intra-ocular tension are quite fully considered as bearing upon the pathology of glaucoma.

The chapter upon the neurology of the eye gives a good *resume* of the value of ocular symptoms in the diagnosis and localization of disease of the nervous system—so important in certain conditions and valueless in others.

In an appendix, the translator, Dr. Foster, gives an account of

asthenopia, particularly as developed in this country and some of the special methods of measuring the refraction, and also the imbalance of the extrinsic muscles, with some hints as to the appropriate treatment. Asthenopia of nervous origin and the form dependent upon reflex causes are briefly considered.

The work as a whole may be described as a satisfactory exposition of modern ophthalmology. It is perhaps not so well adapted for beginners as certain more elementary text-books and contains nothing strikingly novel; it sets forth modern conceptions clearly for the reader who comes prepared with some previous acquaintance with the subject.

We take pleasure in repeating here what we have said in our review of the first volume, viz., that Dr. Foster has been most successful in giving the work an English dress. It reads almost as if it had been originally written in English and this is high praise for any translation. He is also to be congratulated in having permitted the original German author to expound his own views without doing them to death by constant interpolation of the translator. The book is an expensive one, and this counts in these days when almost every teacher in every medical school, the world over, considers it his bounden duty to put forth in some form, an exposition of his own upon the subject in which he is interested.

T. B. S.

GUIDE TO MIDWIFERY. By DAVID BERRY HART, M.D., F.R.C.P.E., Lecturer on Midwifery, School of the Royal Colleges, Edinburgh. Pp. 765, with 4 illustrations in color and 268 diagrams. New York: Rebman Company.

HART presents his *Guide to Midwifery* in two parts. The first and larger section is devoted to a clear and full exposition of the necessary facts of obstetrics from a modern standpoint. To each chapter is appended a scheme for the practical instruction of the student. References are made to the various atlases, models or specimens to be examined in connection with the text. References are also given to corresponding sections of the second part.

The author states in the preface his belief that a text-book on midwifery should not be copiously illustrated, but that one should obtain his ideas of the subject from the knowledge gained by the actual handling of specimens. The illustrations are with a few exceptions, well executed and include several excellent colored plates. Many reproductions of frozen sections are shown to illustrate the steps in the mechanism of labor, and the pathological conditions of the parturient canal.

While giving an otherwise good system for the examination and

care of the pregnant woman, in the chapter on hygiene of pregnancy, no mention is made of antepartum pelvimetry or of routine estimation of the blood pressure.

A thorough discussion of eclampsia is given at the expense of only brief notes on the less severe forms of the toxemias of pregnancy. The repeated statement that chloroform may be given with entire safety to the pregnant woman, especially in the treatment of eclampsia, may be subject to question in the light of recent investigations.

Proper emphasis is placed on the importance of breast feeding in a well written section on the infant. Among the pathological conditions of the infant no mention is made of hemorrhagic disease or of its successful serum therapy.

The various obstetrical operations are described in detaill The classical Cesarean section being favored by the author in the treatment of labor in contracted pelves rather than the girdle splitting operations or the lately revived extraperitoneal Cesarean section.

The second part of the book entitled "Notes and Discussions" takes up in an order corresponding to the first part the various theories, old and modern concerning disputed points. New operations are described and comparative statistics are included. In the chapter on evolution of obstetrics is found a discussion of Darwinism, Mendelism, and Weissmanism and their relation to this branch of medicine. A short section sums up the more recent views of the relations of the organs of internal secretion to the reproductive period.

The literature is given in a separate section under specific headings and a comprehensive index is added. There is much to be recommended in the book, especially the method of arrangement.

P. F. W.

THE SURGERY OF THE STOMACH. A HANDBOOK OF DIAGNOSIS AND TREATMENT. By HERBERT J. PATERSON. Pp. 304; 74 illustrations. New York: William Wood & Company, 1913.

WE have in this volume a consideration of a field of surgery which, in its scope and usefulness, is growing rapidly. It is covered fully but not with burdensome detail. The methods of examination and the operations described, and the opinions expressed, are almost entirely those employed by the writer. Little space is given to the work of others in this field, except to that of W. J. Mayo who is freely quoted and to whom the book is dedicated. The first chapter of sixteen pages is devoted to the method of investigating gastric conditions, including those of the duodenum, and at the

end of the book is an appendix of fifteen pages in which is described the technique of the various methods of examining the gastric contents. The descriptions of operations and the illustrations are, in the main, excellent, although some of the views expressed are not in agreement with those commonly entertained. For instance, it is not generally agreed that it is immaterial whether the anterior or posterior gastrojejunostomy be performed. Nor is it in accord with general surgical practice in this country to sacrifice the advantages of the Roosevelt or other three-jawed clamps in this operation. The description of gastrectomy is somewhat confused by the fact that the illustrations are those of W. J. Mayo, and the writer's description does not tally with them, particularly with regard to the application of the clamps. Nor does it seem proper to approve in a book of this kind, the recommendation of proprietary articles of food, one of which has been especially offensive in its method of advertising, and has been criticised by our representative medical journals. These, however, are minor deficiencies and do not retract from the generally high standard of the work, which will undoubtedly meet with an appreciative reception from those who need books of this kind. At the end of each of the more important chapters is a valuable summary of the important facts in the chapter, which will aid the reader in carrying the facts to the bedside and operating table. T. T. T.

HYPNOSIS AND SUGGESTION. By W. HILGER, M.D., of Magdeburg, Translated by R. W. FELKIN, M.D., F.R.S.E. Pp. 233. New York: Rebman Company.

THE introduction to this book is a practical summary of what follows, it being written by Dr. Van Renterghem. Judging from it and from the contents of the volume itself, it is principally a defense and exposition of the fact that Liebeault of the University of Nancey was the originator of modern hypnotism and its treatment. It then gives a history of this master, his methods and the theories upon which hypnotism are based. According to him healthy persons are most suitable for hypnotic treatment, whereas Charcot and those who followed him claim that hypnosis could be induced only in those suffering from nervousness, especially hysteria, and that it was a dangerous weapon, useless for therapeutics and only useful for experimental research. Following Liebeault, Bernheim, Vogt, and Forel did excellent work in hypnosis. There is a scathing criticism of Dejerine and Dubois, in which the former is accused of having made use of the writings of Liebeault without giving him credit, while of the latter, who

published his book in 1904, it is said that in reading this book everything that is worth while in suggestive therapeutics originated with him. On the contrary, great credit is given the new school of psycho-analysis as exemplified by its originator Breuer and its most famous exponent, Freud.

The volume itself, while it is written for the laymen and the general practitioner, is nevertheless a very good exposition of hypnotism, its methods of application and the results to be obtained from it. Everyone of us know that there is a deep-rooted skepticism of the uses of hypnosis in the treatment of disease. This is largely because of the commercial uses made of it. That hypnotism is a legitimate and excellent method of treatment for some functional diseases, there is no question, for certainly such men as Vogt, Forel, and others who have been mentioned would not use it. The truth of the matter is that hypnotism should be employed, but carefully, and *only* in the hands of those who are thoroughly capable of applying it. Its indiscriminate use by poorly trained individuals should be strongly condemned. The author has apparently had good results, but even he makes claims which are somewhat difficult to believe. T. H. W.

THE CARE OF THE SKIN IN HEALTH. By W. ALLAN JAMIESON, M.D., Consulting Physicians for Diseases of the Skin, Edinburgh Royal Infirmary. Pp. 109; 2 illustrations. London: Henry Freude, Hedder and Stoughton.

THE author divides the subject matter in his little volume into an easily understood description of the structure of the skin, the care of the skin, the care of the hair and the nails, and suggestions as to diet and clothing. The small work is evidently intended for the general public as the author has made the entire volume quite understandable to the lay comprehension. Particular stress is laid upon the bathing regulations, as to the temperature of the water, the composition of the soap, and frictional exercises following the ablution. F. C. K.

MANISCH-DEPRESSIVES UND PERIODISCHES IRRESEIN ALS ERSCHEINUNGSFORM DER KATATONIE. Eine Monograph von DR. MED. MAURYCY URSTEIN, Warschau. Pp. 650. Berlin und Wien: Urban und Schwarzenberg, and Rebman Co., N. Y.

THIS monograph is the complement of the previous one written by the author upon *Dementia Præcox and its Relation to Manic-*

depressive Insanity. The present work is upon manic depressive and periodic insanity, and its relation to katatonia. The author comes to the conclusion that these two types of insanity should not be considered as distinct, but are really states of katatonie. He bases his conclusion upon an analytical study of thirty cases. It is a splendid bit of work, and should be read by everyone who is interested in insanity because it exemplifies what can be accomplished by profound analytical study, and is a distinct advance in modern psychiatry. T. H. W.

GOULSTONIAN LECTURES, 1912; MODERN VIEWS UPON THE SIGNIFICANCE OF SKIN ERUPTIONS. By H. G. ADAMSON, M.D., F.R.C.P. (Lond.), Physicians for Diseases of the Skin, St. Bartholomew's Hospital. Pp. 103; 43 illustrations. London: John Bale, Sons & Danielsson.

ALTHOUGH practically every other field of medicine has been covered in the Goulstonian lectures, a dermatologist has not delivered this series of talks since Dr. Liveing delivered his classical exposition upon leprosy. The little volume under review consists of the three lectures delivered by Dr. Adamson before this representative body. No more interesting subject could have been selected than the study of the significance of skin eruptions, as viewed from the most modern and advanced point of view. A considerable portion of the volume is devoted to local and general immunity in various diseases of the skin and to the interesting subject of anaphylaxis. The local reaction of the different layers of the skin, depending upon the irritating stimulus is plainly shown. The author takes the view, that in at least certain diseases, the eruption is a defensive reaction to the causative reagent; the type of the outbreak depending upon the character of the stimulus. The very interesting local and general immunity that is produced in certain deep-seated trichophyton and the cuti-reaction to cultures of the ringworm are among the most interesting details presented in the book. Among other phases of the subject touched upon are the relationship of immunity production to the treatment of skin diseases; the idea and the origin of toxins; the relationship of toxic bodies to erythematous, urticarial, and drug eruptions; the origin of eruptions resulting from toxins from a distant bacterial focus; auto-intoxication; the significance of the patterns and distribution of skin eruptions, as to the influence of local physical agents. The little volume cannot be too strongly recommended to all those interested in dermatology and modern views on the etiology of diseases of the skin. F. C. K.

MINOR SURGERY. By LEONARD A. BIDWELL, F.R.C.S., Senior Surgeon to West London Hospital, Dean of Post Graduate College, etc. Second edition; pp. 292; 129 illustrations. London: University Press, by Hodder & Stoughton, and Henry Froude.

THIS work has gone to its second edition in twelve months, an argument in favor of its meeting the needs of the times. In every respect the changes in this edition are improvements over the first edition. The size of the volume, the binding, and the more extensive index are all advances. There has been added a chapter on bandaging and minor injuries which contain all that is necessary for a general practitioner to know. The work is not meant to be a completed treatise on any one of its subjects, but is meant to give simple and clear directions for the management of everyday surgical procedures. The attention to detail is worthy of note everywhere in the book with but few exceptions, and in many instances the author states facts of utmost importance, which have been experienced by him and yet are not mentioned in more extensive works in surgery.

The text is clear, concise, and to the point. There is no theorizing and no statements made that are not proved facts. Symptomatology is not touched upon, the entire work being given to treatment. The book is an admirable one for students, nurses, internes, and general practitioners, but is rather too elementary for surgeons of any experience, which I believe is the claim made by the author. E. L. E.

STUDIES IN PSYCHIATRY. By MEMBERS OF THE NEW YORK PSYCHIATRICAL SOCIETY. Pp. 222; 14 illustrations. New York: The Journal of Nervous and Mental Disease Publishing Co.

As represented by the title this volume consists of reprints of fifteen papers written by various members of the New York Psychiatrical Society. It is difficult to pick out a particular paper of this important group for review. Perhaps the most interesting is one by Dr. Frederick Peterson on "The Insane in Japan," and one on "The Curability of Early Paresis," by Dr. Charles L. Dana.

The papers here represented constitute the first of a series which are to be published by this Society. T. H. W.

PROGRESS

OF

MEDICAL SCIENCE

MEDICINE

UNDER THE CHARGE OF

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Primary Splenomegaly (Gaucher Type).—MANDELBAUM (*Jour. Exper. Med.*, New York, 1912, xvi, 797), after a review of the reported cases and study of a case of his own with autopsy, concludes that primary splenomegaly of the Gaucher type is a distinct disease, related in all probability to the blood diseases. It begins usually at an early age, frequently affects several members of a family, and runs a chronic course. The clinical manifestations are: Pronounced hypertrophy of the spleen; subsequent enlargement of the liver; discoloration or pigmentation of the skin; tendency to epistaxis or other hemorrhages; absence of palpable lymph nodes; absence of jaundice and ascites, and absence of characteristic blood changes. The lesions are found in the spleen, lymph nodes, bone marrow, and liver. These organs show iron-containing pigment and large multinuclear cells with a characteristic cytoplasm. In the early cases, peculiar large phagocytic cells arising from atypical large lymphocytes are found in the follicles of the hemapoietic system. After leaving the follicles these cells possess phagocytic qualities for a certain period. As a result of the phagocytosis the cells enlarge, the nature of the cytoplasm changes, and the cells acquire a characteristic vacuolated and wrinkled appearance. The cells are carried from the spleen through the portal system to the liver, where they are destroyed. The irritation produced by this destructive process gives rise to an increase in the intralobular connective tissue. The disease is eminently a chronic one, without any of the manifestations of malignancy, and always terminating as the result of some intercurrent affection. The etiology is unknown, although a family predisposition to some toxic agent which causes an

irritability of the follicles in the hemapoietic system probably exists. The possibility of some protozoan infection, as an etiological factor, must not be overlooked.

Renal Diabetes during Pregnancy.—J. Novak, O. Porges, and R. Strisower (*Deutsch. med. Woch.*, 1912, xxxviii, 1868) have made a study of the spontaneous glycosuria of pregnancy. In 2 cases they found that the excretion of sugar was independent of the diet. With the carbohydrates eliminated from the food, sugar was still excreted in the urine; but an abundant supply of carbohydrates in the diet did not lead to a corresponding increase of the sugar in the urine. Furthermore, they found that the glucose content of the blood was normal, even subnormal. They were dealing, therefore, with a condition which has been described as renal diabetes, in which it is supposed that the kidney, as in phloridzin glycosuria, is abnormally permeable to sugar. The previously recorded cases have been unassociated with pregnancy. It was anticipated by the authors, then, that the occurrence of renal diabetes in 2 consecutive pregnant women was more than a coincidence. They have been able to observe 5 other pregnancies with glycosuria, and in none of them was there a hyperglycemia, in none was the quantity of glucose in the urine influenced to any considerable degree by variations in the quantity of carbohydrate consumed. In 2 of the patients who have been delivered, the glycosuria has ceased spontaneously. Novak, Porges, and Strisower are of the opinion that renal diabetes and pregnancy are not infrequently associated.

Edema of the Lower Part of the Esophagus from Vomiting.—At the suggestion of Professor Schmorl, F. Rost (*Deutsch. med. Woch.*, 1912, xxxviii, 1694) has examined the esophagus in a large series of autopsies. This was done, because Schmorl had noticed a rather marked edema of the cardiac end of the esophagus in several cases of septic peritonitis. Rost's study showed that edema is the rule in such cases. It affects the mucosa, the submucosa, and extends into the muscularis mucosæ. The edema seldom extends more than 3 to 5 cm. above the cardiac end of the esophagus; in other words, it affects the intra-abdominal portion of the esophagus. In all cases where marked edema was found, vomiting had been a prominent symptom. In other conditions with frequent vomiting shortly before death, such as strangulation of the bowel, cancer of the stomach, etc., edema was found only in about one-half of the cases; it was never very marked. Again, in cases of septic peritonitis in which there had been little vomiting, edema was usually slight. The author believes, therefore, that vomiting is an important factor in the production of edema of the lower end of the esophagus, but that the toxins absorbed from a septic exudate also promote its development.

Experimental Observations on the Influence of Venesections and Intraperitoneal Blood Injections on the Number and Resistance of Red Blood Corpuscles.—K. Oczesalski and St. Sterling (*Deutsch. Arch. f. klin. Med.*, 1912, cix, 9) have tested the effect of withdrawal of blood and of intraperitoneal blood injections experimentally on

rabbits, in an attempt to discover whether the method might have value in the treatment of human anemias. They find: (1) Venesections, even when large, if not repeated at too frequent intervals, not only produce no harm, but cause an increase in the resistance of the red blood cells. (2) Venesections in connection with injections of the same blood in the peritoneal cavity are harmless to the healthy animal and increase the resistance of its red blood corpuscles and also the total number of red cells. (3) Venesections in connection with injections of the shed blood in anemic animals cause an increase of hemoglobin and total red count and of the resistance of the red blood corpuscles. A similar procedure would seem to be justifiable in simple, chronic, post-hemorrhagic anemias, of course, with strict asepsis. (4) Injection of foreign blood following venesection produces the same results in anemic animals as described in (3). Clinically, this is less useful, as a donor must be found. (5) The same results follow the injection of foreign blood without venesection.

On the Relation of Eosinophilia to Anaphylaxis.—H. SCHLECHT and G. SCHWENKER (*Deutsch. Arch. f. klin. Med.*, 1912, cviii, 405) summarize their experimental observations on the relation of eosinophilia to anaphylaxis as follows: Through continued parenteral administration of foreign protein a peripheral blood eosinophilia may be produced in the guinea-pig. With large doses a similar result may be obtained in dogs. Following recovery from anaphylactic shock an intense eosinophilia likewise occurs. Furthermore, the lungs of guinea-pigs which have withstood anaphylactic shock, exhibit a marked eosinophilic infiltration of the lung tissue and a peribronchial collection of these cells. Similar changes may be produced in animals sensitized intraperitoneally, by inhalation of serum. The peribronchial and pneumonic infiltrations are markedly eosinophilic, in contrast to the pneumonias produced by inhalations of bacteria. In Arthus' skin phenomenon the cells of the inflammatory swellings are chiefly eosinophiles. A local eosinophilia of the submucosa is seen in the intestine of dogs following anaphylactic enteritis. A local production of eosinophilous was not observed in these conditions. It is evident that the eosinophiles play a definite role in anaphylaxis. The authors are inclined to the view that certain products are formed in parenteral administration of protein which exert a positive chemotactic action upon the eosinophilic cells; they are attracted from the blood and bone-marrow, where they are present in increased numbers. Whether they are dealing with a single substance or several distinct bodies is unknown.

Observations in Two Cases of Pentosuria.—KJ. OTTO AF KLERCKER (*Deutsch. Arch. f. klin. Med.*, 1912, cviii, 277) has made a careful study of the urine of 2 patients with pentosuria. It is of interest that the patients were brothers, that a third brother suffered with diabetes mellitus, and that the father of the three was a diabetic. Klercker found that the osazone obtained from the urine of each patient was dextrorotatory. By the degree of rotation found, it is practically certain that the pentose in one of the cases was l-arabinose, while in the other there was a mixture of the d- and l- components, with the

l- predominating. These findings are in line with those of Neuberg and Luzzatto. It is evident, therefore, that in pentosuria the isomers may be mixed in varying proportions. The source of the pentose remains obscure. The nucleoproteids of the body cannot be excluded. Hunger or insufficient food causes a decrease in the excretion of the pentose. Like other observers, the author has found no relation between the glucose of the food and pentose excretion. The parallelism in the excretion of pentose and total nitrogen determined hourly is striking, and suggests an intimate relationship between the pentose and protein metabolism. Glucosamine, as shown by the results of administering it to the patients, does not increase the amount of pentose in the urine. Klercker was able neither to confirm nor refute Neuberg's observation regarding the possibility of formation of pentose from galactose. Following the administration of lactose, there was a sharp rise in the quantity of pentose in the urine, which did not, however, increase the total output beyond the theoretically possible limit.

On the Production of the so-called "Zellschollen" in Lymphatic Leukemia.—A. SPULER and A. SCHITTENHELM (*Deutsch. Arch. f. klin. Med.*, 1912, cix, 1) report their observations on a case of lymphatic leukemia. The so-called Gumprecht's shells or shadows which one sees in lymphatic leukemia, arise from lymphocytes with relatively pyknotic nuclei through bursting of the nucleus and mixture of the nuclear constituents with those of the cell protoplasm. The study of a fresh gland from a patient revealed similar pyknotic cells. From this material it was evident that the chromatin of the cells in addition to being diffusely distributed is also seen in clumps or plump strands. Germinal centres, such as are found in the normal lymphatic glands, were not encountered, but areas in which mitoses were numerous indicated that there was active proliferation of the cells. Phagocytosis of red blood cells was observed in the lymphatic glands. A gradual transition of these phagocytes to typical eosinophiles, whose nuclei later became polymorphous, was observed. These cells originated locally and not from bone-marrow elements.

Disturbances in the Hydrochloric Secretion in Diseases of, and following Extirpation of the Gall-bladder.—H. HOHLWEG (*Deutsch. f. klin. Med.*, 1912, cviii, 255) reports gastric analyses from a large number of patients with disease of, or following extirpation of the gall-bladder. He found after extirpation of the gall-bladder that of 39 patients only 10 per cent. had normal hydrochloric acid following a test breakfast. The remainder (74.3 per cent.) had either subnormal values or an actual deficit of hydrochloric acid. Three cases with normal acid were not included in the series; two suffered from gastric ulcer, the third had icterus, conditions frequently associated with hyperacidity. Hohlweg believes that a more careful analysis would have resulted in the diagnosis of similar complications in some of the other cases with normal hydrochloric acid. Among 43 patients with closure of the cystic duct or atrophy of the gall-bladder, 84 per cent. exhibited a hydrochloric acid deficit, 6 patients had subacidity, and only once was the hydrochloric acid normal in quantity. The

conditions here are, therefore, analogous to those following extirpation of the gall-bladder, and the gastric findings are the same. In a series of 15 cases of cholecystitis, some with calculi but without closure of the cystic duct, hydrochloric acid deficit was found 13 times, and in the remainder there was subacidity. Hohlweg next examined the gastric contents of dogs before and after cholecystectomy, and the results were similar to those encountered in man. In a young married woman the gastric contents during an attack of gallstone colic showed a hydrochloric acid deficit of 20, total acidity of 32. Two stones were recovered from the stools. A week later free hydrochloric acid 38, total acidity 74 Finally, Hohlweg cites several histories of elderly patients with loss of weight, gastric symptoms, and hydrochloric acid deficit, in whom a diagnosis of gastric cancer was made. Operation showed nothing in the stomach, but there was marked disease of the gall-bladder.

Calcium Metastases and Calcium Gout.—M. B. SCHMIDT (*Deutsch. med. Woch.*, 1913, xxxix, 59) has made a careful study of a case presenting extensive calcification and has arrived at the following conclusions: An excess of calcium in the blood alone can lead to deposition of calcium in healthy organs, as shown in Tanaka's experiments and in many cases of calcium metastases in skeletal diseases of man without nephritis. This, however, is uncommon in man, for usually there exists a nephritis. On the other hand, extensive calcification may occur in some parts of the body, without increase of the calcium contained in the blood, through resorption from the bone; in such cases there is usually, but not always, a nephritis. In these cases the author believes that there is not a primary dystrophy but rather an altered (lowered) solubility of clacium in the blood. The usual participation of the acid-secreting organs in the calcification can occasionally be augmented by pathological changes in the tissues. In the pathologically predisposed organs—lungs, gastric mucosa, kidneys, bloodvessels and possibly the myocardium—calcification, can occur without preceding pathological changes, as happened repeatedly in Schmidt's case. When necrosis is found after dissolving the calcium, Schmidt believes it is to be interpreted as the result of the deposition calcium, not the cause. Such a conception is similar to the prevailing theory regarding gout, namely, that gouty deposits result from a primary disturbance of uric acid metabolism with precipitation of salts in healthy tissues and secondary necrosis. Therefore, the name calcium gout is appropriate for the condition described.

A Method of Differentiating between Ascites and Fluids from Ovarian Cysts.—A. DIENST (*Münch. med. Woch.*, 1912, lix, 2731) alludes to the importance of differentiating at times between ascites and a flaccid ovarian cyst, if exploratory operation is refused and one has to resort to tapping of the abdomen. The appearance of the fluid may not be characteristic, for at times the fluid of the cyst closely resembles the usual serous ascitic fluid and, on the other hand, a pseudochylous or chylous ascitic fluid is not unlike many fluids obtained from cysts. Dienst has found that fibrin is a constant constituent of ascitic fluids, while it is absent in the fluids of ovarian cysts. As a

qualitative test for fibrin, he adds to the fluid in a test-tube crystals of sodium chloride equal to one-third the volume of the fluid. After solution of the salt a flocculent precipitate forms, if fibrin is present. The absence of a precipitate indicates that the fluid was obtained from a cyst and shows the need of operation.

SURGERY

UNDER THE CHARGE OF

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The Radical Operation for Cancer of the Uterus.—CLARK (*Surg., Gynec., and Obst.*, 1913, xvi, 255) offers the following summary from a review of the literature and from personal experience: The operation in expert hands, notwithstanding its high primary mortality, has given the greatest of permanent cures of any therapeutic procedure thus far suggested for cancer of the uterus. While the above conclusion is true, the general adoption of the operation, in view of its dangers and difficulties, is not to be advised until the primary mortality can be reduced to a much lower percentage by simplification or perfection of details. The abandonment of the extensive glandular dissection is justified, because this detail adds to the hazards and does not sufficiently raise the percentage of permanent cures. The cardinal advantage of the operation lies, first and above all, in the excision of an extensive cuff of vagina and the widest possible removal of the parametrial tissue. There is no middle-of-the-road policy in cancer of the cervix. The surgeon would better perform a simple hysterectomy or high amputation of the cervix with extensive cauterization than to attempt the radical operation if he is not prepared effectively to execute its details. The earnest endeavor by many specialists, with the improved ultimate cures in a few hands, offers the hope that a further simplification and perfection of details in this operation may yet make it more generally available.

Results after the Wertheim Operation for Carcinoma of the Cervix of the Uterus.—NEEL (*Surg., Gynec., and Obstet.*, 1913, xvi, 293) made a study of the cases treated at the Johns Hopkins Hospital and concluded that the extensive abdominal removal of all uterine cervical carcinomas is justified where there is any hope of complete excision. An exploratory laparotomy is often necessary to determine whether

or not a case is operable. The preliminary catheterization of the ureters is a valuable aid, especially in fat patients, and does not necessarily increase the probability of fistulæ or secondary infection of the urinary tract. Preliminary cauterization and disinfection of the primary growth is advisable in all cases. A horizontal lipectomy in obese patients decreases the depth of the field of operation and shortens the time necessary for its completion. All patients should be kept in the Fowler position for several days, unless this is otherwise contraindicated by symptoms of surgical shock. By improvements in the technique of the operation, the primary mortality has been decreased from 28.5 per cent. for the first seven years to 11.7 per cent. for the last five years. Aside from the discovery of the etiological factor of carcinoma of the cervix of the uterus and its successful elimination, the greatest hope lies in the early recognition and wide excision of the primary growth.

The Treatment of Beginning Gangrene.—Borchardt (*Zentralbl. f. Chir.*, 1913, xl, 297) says that the question of when and where to amputate for gangrene of the foot is still undecided. Moscowicz decided the site by observing the level to which the reactive hyperemia of the skin reached, after a temporary removal of the blood from the affected limb. In this way he determined how much of the tissues were being supplied with blood. Borchardt regards this as a good aid in determining to what extent the tissues are being nourished, but says that the temporary application of a tourniquet is exceedingly painful to some patients, and that in cases with severe arteriosclerosis the necessary evacuation of blood and reactionary hyperemia cannot be obtained. Its application has little influence in improving the condition of the circulation and preventing the gangrene. He employed the following method in a man, aged fifty-four years, with senile gangrene of the toes and severe pain. After three months existence of the gangrene, two toes had been exarticulated, and later, as the gangrene was of the moist variety and there was a phlegmon of the foot, amputation in the thigh was performed. It was observed that at the site of amputation the femoral artery was almost closed. After a very severe struggle he recovered. Then there began in the other foot symptoms of beginning gangrene, just as in the first foot, with severe pain, cyanosis, etc. As the usual treatment, including elevation and moist warmth, failed, Borchardt concluded to employ alternating warm and cold baths of the limb to the knee. Two deep buckets were filled with water, one at a temperature of 35° C., the other with standing water. The limb was placed in each bucket alternately, for a few seconds. The changing from one to the other was repeated in the beginning thirty times, later fifty times. Gradually the temperature of the water was increased to 50° C. in the one bucket, and in the other to that of running water. These baths were taken morning and evening for a week, when the pain promptly disappeared. During the baths the leg was always very red and warm. It showed a more active hyperemia than with the use of the warm water alone. The patient has continued the baths for three-fourths of a year, and has not developed gangrene in this limb. On the contrary, the circulation of the limb shows continuous improvement. The baths stimulate the

collateral circulation and can considerably improve the peripheral blood supply in the presence of existing gangrene, and thus extend, peripherally, the limit of the amputation area. The method should not displace the present methods, as Moscowicz's method, but should amplify them.

The Diagnosis and Treatment of Gangrene of the Foot.—Moscowicz (*Zentralbl. f. Chir.*, 1913, xl, 507) calls attention to the fact that the objections to his method raised by Borchardt, can be overcome. He has often found that the application of the tourniquet is unnecessary. It suffices in most cases to elevate the affected limb for one or two minutes, in order to render it bloodless. That alone is a sign of disturbed circulation, since a mere elevation should not produce such a complete anemia. If the limb is then let down it slowly becomes red, but much more slowly than if the arteries are normal. In many cases he has allowed the limb to hang down vertically to favor the return of the blood, and even in this position one or several toes have remained pale a long time or persistently. By thus changing the position of the limb the same changes in circulation can be obtained as by Borchardt's alternating baths. He has also seen in one patient the pain of a deficient circulation moderated by the use of Klapp's suction apparatus, and the beginning gangrene probably retarded. He does not doubt that Bier's method of inducing passive hyperemia has a similar effect in quieting the pain and improving the nourishment. It is probable that the anastomosis of the femoral artery and vein will produce a similar effect, the more through the stasis due to the ligation of the vein than to the turning of the blood stream.

The Treatment of Beginning Gangrene.—Frank (*Zentralbl. f. Chir.*, 1913, xl, 508) confirms the value of Borchardt's method with the report of a striking case. A soldier suffered from frozen feet, which, on both sides, including the lower thirds of the legs, were edematous, cyanotic, cold, and tender on the dorsum of the feet. From the tender areas downward, they were without feeling. There was severe, almost unbearable pain in the parts of the limbs involved which had feeling. The saving of the toes and middle portions of the feet seemed hardly possible. It seemed that a Chopart amputation would be necessary. At best a Lisfranc, and at the worst an amputation in the upper third of the leg was in prospect. The alternating baths were tried and kept up for six months. The effect was striking. The right foot is now sound and useful. On the left side the great toe and a part of the plantar fascia were excised for gangrene. All the other tissues were preserved.

The Treatment of the Pyelotomy Wound.—Bastianelli (*Zentralbl. f. Chir.*, 1913, xl, 420) says that surgeons are now favoring pyelotomy for renal calculi as against nephrolithotomy, but that the special technique has not yet received much attention. He believes that if the proper indications are observed and the operation properly performed, the details of the suture are not particularly important. The wound in the pelvis heals without suture, if there is no obstruction

to the outflow of the urine, the infection is not severe, or the wound is not too large or irregular. Yet it is not advised that the suture should be systematically avoided. The incision may be made directly through the fat and pelvic wall, and the closure made by catgut sutures which include both layers to the submucosa. This applies especially to cases in which the kidney cannot be delivered from the wound. In one case a large calculus was exposed through a pelvic incision. Because the stone could not be palpated easily, the pelvis was well freed from the surrounding fat. After extraction of the stone, the sutures used to close the pelvic opening cut through. The wound was not superficial and its closure was accomplished by a quadrilateral flap taken from the fibrous capsule of the kidney, from which the fat was removed. Mayo used the fatty capsule for a similar purpose. In cases with stones in the calyces, the pelvis should not be explored too much with the finger or forceps, but a radial incision should be made directly over the stone through the renal parenchyma. The wound can be closed with sutures, and these overlaid with a fatty flap with good results. In a mildly infected hydronephrosis, the cause of which was a stricture at the upper end of the ureter, the pelvis was widely opened, the stricture divided anteriorly, and posteriorly. The wound was then closed in a transverse direction with a single row of sutures, and covered with a broad, fatty flap. Primary union resulted. When, because of the depth of the wound and the shortness of the pedicle, the kidney cannot be delivered, the fat should not be freed from the pelvis, but the incision should be made directly on the stone and the wound afterward left unsutured. The surrounding fatty tissue applies itself over the wound and closes it.

The Etiology, Symptomatology, and Pathogenesis of Acute Intestinal Obstruction.—Polacco and Neumann (*Deutsch. Zeitschr. f. Chir.*, 1913, cxxii, 42), in an operation for an acute intestinal obstruction, found the jejunum, at about its middle, strangulated by a long, thin, fibrous band, which passed from one coil of intestine to another. In this central protion of the jejunum were a number of protuberances from the surface of the bowel, each about the size of a pea and rather firm in consistency. The strangulated portion of the jejunum was encircled by a ring formed by the fibrous band which seemed to be formed by the union end-to-end of two elongated and pedunculated protuberances, similar to those found on other portions of the bowel. After the division of the band, the serosa at the site of strangulation was seen to be smooth, and the distal coils of intestine immediately filled with gas. The numerous, peculiar protuberances which were most numerous in the direction of the appendix suggested that a previous appendicitis combined with a fibrous peritonitis may have been responsible for them. The appendix was found posteriorly, surrounded by fibrous adhesions which showed the same peculiar protuberances found on the intestine. The appendix was removed as well as some of the protuberances. The histological examination disclosed that the rounded ends of the protuberances were made up of a connective tissue, rich in nuclei, and had a similar connective tissue capsule. There was some necrosis, partial hyaline degeneration, and edematous infiltration. The pedicle possessed abundant young

connective tissue and capillaries. It is concluded that there occurs an apparently little-known development of organized peritoneal exudate, in the form of a pedunculated formation, the end being about the size of a pea. Two such bodies may adhere to each other and cause a probably post-traumatic (as from blows on the abodmen) strangulation of the intestine. In these cases two rare symptoms occur; a bradycardia with a pulse of about 52, and a retardation of the effect of morphine. The latter is probably due to the administration of the morphine by mouth into a well-filled stomach. A quick and easy cure can be obtained by a right-sided operation.

THERAPEUTICS

UNDER THE CHARGE OF

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Whooping Cough. Its Treatment with Vaccine.—WILSON (*New York Med. Jour.*, 1913, xcvii, 823) reports a series of 24 children with whooping cough treated by pertussis vaccine. He gave the vaccine in doses of 20,000,000 to 40,000,000 bacteria. The dosage was controlled, after the initial dose, by the range of temperature and the severity of the cough. The paroxysms diminished in frequency and in severity and in some of the children very promptly. The characteristic whoop disappeared and the cases soon became clinically simple cases of bronchitis. The shortest duration of treatment was nine days, the longest forty-eight days, and the average twenty-three days.

The Vaccine Treatment of Whooping Cough.—SILL (*Amer. Jour. Dis. of Child.*, 1913, v, 379) has employed pertussis vaccine for the treatment of 33 children suffering from whooping cough. He believes that the vaccine markedly diminished the number and severity of the paroxysms and the amount of vomiting. The dosage of the vaccine was regulated more by the severity of the disease than by the age of the child. The youngest child treated was one month old and the oldest was six years. Most of the children were from six months to three years of age. The dosage of the vaccine varied from 20,000,000 in the mild cases to 60,000,000 in the severe cases. The cases that were treated early in the disease seemed to respond more quickly to the treatment, and the course of the disease was shortened. In all cases, however, after one to three injections the number and severity of the attacks were markedly diminished. The children showed greater improvement when the vaccine was given in moderately large doses at intervals of from one to two days. Sill advises as the correct dosage for mild cases 50,000,000 bacteria every other day, and for severe cases this same dose every day or 100,000,000 every other

day. The vaccine is given subcutaneously in the abdomen or buttocks, and no untoward effects were noted. No inflammation, swelling, or constitutional symptoms occurred after the injections. Sill also gave the vaccine to children constantly exposed to whooping cough, as a prophylactic measure, and none of these children contracted the disease. He believes that the vaccine when injected in small doses has a certain immunizing action against whooping cough.

The Effect on the Nervous System of Healthy Rabbits of Large Doses of Salvarsan.—Doinikow (*Münch. med. Woch.*, 1913, lx, 796) writes concerning experiments undertaken to determine whether the hemorrhagic encephalitis reported by many different observers as a result of salvarsan injections was really due to salvarsan. He could determine no histological changes in the nervous system of rabbits that received for long continued periods of time considerably larger doses than the usual therapeutic doses of salvarsan. Only in experiments where distinctly poisonous doses were used (0.11 to 0.15 gram per kilo) could any alterations in the nervous systems be determined. These alterations consisted of congestion and hemorrhages, but no thromboses of the cerebral vessels were found.

Neosalvarsan.—Dreyfus (*Münch. med. Woch.*, 1913, lx, 630) says that neosalvarsan seems in general to be milder and less intensive in its action than salvarsan, therefore salvarsan is to be preferred in the treatment of syphilitic diseases of the central nervous system. Dreyfus thinks that the combined use of salvarsan and neosalvarsan may be of great value in the treatment of many cases of syphilis. One must not forget that untoward by-effects occur with the use of neosalvarsan in spite of its greater solubility. He emphasizes the importance of using freshly distilled water and that the water should be distilled and the solutions made in Jena glass. This last precaution is necessary because certain by-effects observed after intravenous injections of salvarsan have been attributed to the action of alkali from glass.

Mercury and Salvarsan.—Finger (*Wien. klin. Woch.*, 1913, xxvi, 561) says that salvarsan should be used in combination with mercury in early syphilis as a means of abortive treatment. He also advises the use of salvarsan in tertiary syphilis when a rapid effect is desired. Finger, however, believes that salvarsan is not superior to mercury in secondary syphilis, and, furthermore, it should not be used as a routine measure in the treatment of secondary syphilis because of certain dangers. He refers especially to the cranial nerve symptoms that have seemed to occur so much more frequently since the use of salvarsan and that have been directly attributed by some observers to the salvarsan injections.

Trivalin.—Mehliss (*Deutsch. med. Woch.*, 1913, xxxix, 65) says that trivalin is an efficient substitute for morphine in any case where the anodyne or sedative action of morphine is desired. Trivalin has no untoward action on the heart, respirations, or sensorium of the patient, and is, furthermore, less apt to cause gastric disturbance. Trivalin is a combination of morphine, caffeine, and cocaine valerianate.

Adigan, a New Digitalis Preparation.—Fränkel and Kirschbaum (*Wien. klin. Woch.*, 1913, xxvi, 605) write concerning adigan, which is a preparation derived from digitalis. This remedy contains all of the active principles of digitalis with the exception of digitonin and similar saponin-like substances, that have been removed. They claim that the preparation, because of this purification, is free from untoward by-effects especially those of gastro-intestinal irritation and according to their clinical observations the remedy has lost none of the therapeutic effects of digitalis.

The Value of the Karell Diet.—Wittich (*Deutsch. Arch. f. klin. Med.*, 1913, cx, 128) gives his findings regarding the worth of the Karell diet based upon 100 cases of different forms of heart disease. He believes that it causes a marked improvement in practically all forms of cardiac disease and considers that the only contraindication to its use is the presence of uremic symptoms. Chronic myocarditis seems to be more favorably influenced than any other form of cardiac disease. Valvular lesions of the heart are next in order as regards benefit obtained from the Karell diet. Symptoms of cardiac failure in chronic myocarditis are relieved by the dietetic treatment alone, but in valvular disease it is often necessary to combine cardiac tonics with the Karell method of diet. Cases of cardiac failure due to arteriosclerosis are less favorably influenced, and those associated with nephritis are often very little benefited by the Karell diet. However, in some cases of nephritis the diet is of great value in conjunction with medical treatment. When uremic symptoms are present abundant fluids are indicated, and this necessitates a modification in the Karell diet the principles of which are a low chloride content and a limited amount of fluid.

The Treatment of Vincent's Angina.—Citron (*Berl. klin. Woch.*, 1913, l, 627) describes two cases of Vincent's angina that were cured promptly by the local application of a 2 per cent. solution of salvarsan in glycerin. The intravenous use of salvarsan in one of these cases was entirely without effect.

The Treatment of Local Spirochete Infections by Salvarsan and Neosalvarsan.—Gerber (*Münch. med. Woch.*, 1913, lx, 634) advises the use of salvarsan and neosalvarsan in local infections due to spirochetes, such as Vincent's angina, simple gingivitis, stomatitis, noma, alveolar abscesses, and pyorrhea alveolaris. These remedies may be used locally in 5 to 10 per cent. aqueous or glycerin solutions or even applied directly to the local lesion in powder form. They may also be used intravenously but only for severe cases with general symptoms, and for those that resist local treatment.

PEDIATRICS

UNDER THE CHARGE OF

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The Treatment of Scarlet Fever with Neo-salvarsan.—LOUIS FISCHER (*Archiv f. Pediatrics.*, 1913, xxx, 352) refers to the experiments in treating scarlet fever with intravenous injections of neo-salvarsan. Some cases of this disease give a positive Wassermann reaction and this has led a number of investigators to try the above treatment. Lenzmann, Schreiber, and others describe advantages by this treatment which indicate that a decided antipyretic effect is soon noted after the injection, and that there is a decided exfoliation of the necrotic membranes with tendency toward convalescence and absence of fatal complications. Infants received 0.1 gram, older children, 0.2 or 0.3 gram by intravenous injections. Some children required three or four injections. Arsenic alone, as in Fowler's solution was given in scarlet fever without result. Neosalvarsan is readily dissolved in water, shaking is not necessary, and it is a much more simple preparation than salvarsan. Fischer used this treatment in five cases of scarlet fever, all of which were septic and with a fatal prognosis. The Wassermann reaction was negative in three, one probably positive, and one unreported. Injections were given intravenously, the jugular vein being the best selection for giving the remedy. The dose employed was 0.2 gram in 40 c.c. of plain sterile water. No reaction such as shock, acute febrile attack, or rash followed the injection. Three of the cases died, but showed the antipyretic effect of the neosalvarsan. One case improved, following the injection and recovered, the credit of this being frankly given to the effect of the drug. One case was prolonged and is still in the hospital, but with a grave prognosis. While too early to make definite statements as to this treatment, enough has been accomplished to merit an extensive trial of this drug in scarlet fever.

The Etiology of Measles.—JEROME S. LEOPOLD (*Archiv. of Pediatrics*, 1913, xxx, 356) gives a *resume* of the work so far done in determining the etiology of measles. Anderson and Goldberger have proved the presence of the infectious agent in the blood and in the nasal and buccal secretions. Injection of blood from a measles case into monkeys caused characteristic eruption with fever, coryza, bronchitis, and often pneumonia. The infectivity of the blood was greatest shortly before the eruption of measles appeared, lasted twenty-four hours, and rapidly diminished. Hektoen successfully reproduced the disease in adults by subcutaneous inoculation with blood taken from measles cases during the first thirty hours of the eruption. The former investigators also obtained positive results by applying secretions from the mouth and pharynx of measles cases to the mouth and pharynx of monkeys. All attempts to inoculate monkeys with epi-

dermal scales of measles have failed. The virus is ultramicroscopic; desiccation is resisted for twenty-four hours, freezing resisted for twenty-five hours, and infectivity is destroyed by heating to 55° C. for fifteen minutes. All attempts to grow the virus are unsuccessful.

The Cause and Prevention of Adenoid Growths in Children.—H. E. JORDAN —*Archiv. of Pediatrics*, 1913, xxx, 468) believes that the enlargement of tonsils and adenoid growth are the effect of a fundamental, controllable factor, and that the concomitant morbid symptoms are indirectly the result of the enlargement. Increased functional demand causes enlargement of the structures and this demand is caused by mouth-breathing, induced by chronic nasal colds in children. The solution, then, is to promote nose-breathing, which is largely a matter of preventing colds. The ultimate factor in the production of colds is the almost universal inattention to damp linen. Small children are allowed to go "wet" for hours, especially at night. The series of links are damp clothes, exposure, with evaporation and possibly chill; nasal cold with obstruction of the nostrils, mouth-breathing and hypertrophy of lymphoid tissue. Mothers should be more carefully instructed in keeping children dry, and means should be devised to make this condition easier to regulate.

OBSTETRICS

UNDER THE CHARGE OF

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Hebostiotomy.—KRIWSKY (*Monatschr. f. Gebürts. u. Gynäk.*, 1913, xxxvii, No. 4) reports the case of a patient whose first labor was successfully terminated by forceps. In the second labor the child was stillborn; in the third labor a living child was obtained by forceps; and in the fourth labor hebostiotomy by Döderlein's method was done, and an unusually large and well developed child was delivered by forceps. This child died at four months. The pelvis had been enlarged by the previous operation, but hebostiotomy was repeated upon the right side, and a large living child was again delivered by forceps. This child died two years afterward. Eight months after the second operation the *x*-rays revealed the fact that but partial formation of bony tissue had occurred. The patient again came under observation when eight months pregnant, came into labor, and was delivered by Cesarean section, followed by sterilization. Both mother and child made a good recovery. Kriwsky has collected a considerable number of reported cases, showing 76 spontaneous births after hebostiotomy, 26 repeated operations, and 15 cases in which Cesarean section was substituted. He believes that the operation has a place in obstetric procedures, and that the true conjugate should be not less than 7

cm. He would not select it for cases in which the true conjugate was less than 7 cm., and preferably in multiparæ. The operation may be substituted for perforation if the surroundings are favorable for an aseptic operation. Döderlein's method is preferred, and no especial complications are to be expected during the puerperal period. Bony uinion through the severed ends forms very slowly, and in many cases does not develop. Permanent enlargement of the pelvis rarely occurs.

The Influence of the X-rays upon the Membranes.—KAWASOYE (*Zentralbl. f. Gynäk.*, 1913, No. 14) has experimented upon pregnant animals to ascertain the effect of the *x*-rays. No alterations were found in the membranes in the wall of the uterus, but the results of the *x*-rays were in 3 out of 7 cases the production of abortion or premature labor. The liver and spleen of the fetus showed necrosis. Caution should accordingly be exercised in using the *x*-rays upon pregnant patients.

Hematoma of the Abdominal Wall in Pregnancy.—VOGT (*Zentralbl. f. Gynäk.*, 1913, No. 14) reports the case of a young woman in her second pregnancy, who gave birth to a normal infant in spontaneous labor. Several hours after delivery the patient complained of severe pain above the symphysis. No alteration in the skin of the abdominal wall was evident. The uterus was at the umbilicus, well contracted, and little sensitive. Above the symphysis were two superficial tumors which could be moved upon the subjacent tissue. On further examination it was found that these were hematomas at the inferior extremity of the recti muscles. The tumors increased somewhat in size, and their absorption proceeded slowly. Four weeks elapsed before the patient was in normal condition. There was no explanation for their formation.

The Electrocardiogram in Pregnancy.—RUDNER (*Zentralbl. f. Gynäk.*, 1913, No. 13) has used the electrocardiogram in studying the condition of the heart in pregnant patients. Characteristic tracings were obtained which practically confirmed previous clinical observations. The value of the method lies in its graphic demonstration.

Uterus Bicornis Causing Chronic Transverse Position of the Fetus.—VON KLEIN (*Zentralbl. f. Gynäk.*, 1913, No. 13) reports 6 cases of uterus bicornis with transverse position of the fetus treated by version, and one by Cesarean section. It seems more than probable that this uterine abnormality is a frequent cause for transverse position.

The Correlation of the Internal Secretions of the Ductless Glands and the Genital Functions of Women.—BELL (*British Med. Jour.*, April 5, 1913) concludes in two lectures upon this subject, that although there are great variations in the structure of the ductless glands in different mammals, the total functional result is the same, so far as the genital processes are concerned. The individual metabolism of the mother and the metabolism of her reproductive functions are completely interdependent. While the ovaries furnish ova and keep

active the rest of the genital structures and functions, they are also concerned in keeping the other members of the ductless glands active, in relation to the necessity of the reproductive organs. When the reproductive functions cease, and the ovaries atrophy at the menopause, the general relationship is temporarily deranged, and various disturbances follow. It is only by the careful study of each individual case that one can learn in what manner the balance has been destroyed. The basis of treatment for the disorders of the menopause must be found in the disarrangement between the ovaries and the remaining ductless glands. Some patients are benefited by thyroid extract at the menopause; some by pituitary extract; others by various combinations. There is evidence that hyperplasia of the suprarenal cortex can offset the influence of the ovary and produce some of the secondary characteristics of the male in the female body, and partially change the development of the genital organs. The ovary influences the general metabolism in relation to its primary reproductive functions. The thyroid, pituitary, and suprarenals influence the development and preserve the integrity and activity of the genital organs. The thymus and possibly the pineal gland seem to prevent sexual precocity. All the ductless glands control metabolism in proportion to the necessities from the genital functions. When these cease the characteristic phenomena of the menopause develop. On the contrary, insufficiency of the thyroid, pituitary, or suprarenals, cause the genital functions to cease and the uterus to atrophy.

The Ovary as an Organ of Internal Secretion.—GRAVES (*Amer. Jour. Obstet.*, April, 1913) believes that in the present state of our knowledge anatomical evidence makes it probable that the ovary is an organ of internal secretion. Infantilism is not a result of ovarian deficiency, but is a manifestation of deficient development in which the ovary may or may not share. After sexual maturity the ovary has a trophic influence over the other genital organs. The ovaries preside over menstruation by an internal secretion which acts upon the endometrium. Abnormal uterine hemorrhage may be due to increased secretion of the ovaries. The transplantation of ovarian tissue has not proved to be of great practical value in the surgical treatment of gynecological cases. When the ovaries are removed from mature women, vasomotor disturbances follow in 80 per cent. of cases. The removal of the ovaries does not directly cause definite disturbance of the nervous system. If these symptoms are present, they are due to other causes. Ovarian extract is very valuable in treating the vasomotor disturbances which follow the removal of the ovaries. In other gynecological conditions it is of little importance.

The Mucous Channels and the Blood Stream as Alternative Routes of Infection.—BOND (*British Med. Jour.*, March 29, 1913), in a very interesting paper upon this subject, with illustrations, concludes that when an organism like the Bacillus coli communis reaches the pelvis of the kidney by ascending the urinary tract, it produces symptoms in effect which differ from those caused by the same germ that reaches the kidney by way of the blood stream. The organism seems to adapt itself to a mucous and urinary environment, on the one hand, and a blood or lymphatic channel, on the other.

GYNECOLOGY

UNDER THE CHARGE OF

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Treatment of Postoperative Retention of Urine.—The use of pituitrin in the treatment of urinary retention in women after operations and in the puerperium is very strongly recommended by EBELER (*Zeitschr. f. gyn. Urol.*, 1913, iv, 55), who has tried it in 21 puerperal and 24 postoperative cases, with excellent results, finding that by its use he was able in all cases to avoid catheterization. All the injections were given deep into the muscles; they are best given when the bladder is fairly full, and the patient feels the necessity of having it emptied. An injection of pituitrin given under these circumstances is nearly always followed within five minutes to ten minutes by an increased desire to micturate, this usually culminating in a spontaneous evacuation of the bladder; in some instances, however, this does not take place until after the lapse of a few hours. If the injection is given with the bladder only about half full, the action is less marked, but is still distinctly noticeable; if given when the bladder is empty, there is no appreciable effect whatever. Ebeler does not advise giving an injection upon the first intimation on the part of the patient of a desire to pass water, but thinks it is better to wait until there is very distinct discomfort in the bladder region. When once a voluntary micturition has been secured, it has seldom been found necessary to repeat the injection; in only 8 of Ebeler's 45 cases was a second dose required. In all instances the bladder was completely emptied, so far as could be determined by percussion, without using the catheter.

Treatment of Uterine Hemorrhage by the X-rays.—Although great activity along this line has been manifested in recent years throughout Europe, but comparatively little has appeared in the American literature upon the subject; a paper recently read before the Philadelphia Obstetrical Society by PFAHLER (*Amer. Jour. Obstet.*, 1913, lxvii, 860), reporting a series of cases with exceedingly encouraging results, is therefore of considerable interest. This report comprises 23 cases of more or less severe uterine hemorrhage; in 21 of the patients fibroid tumors were present, the other 2 were examples of "metropathia," without demonstrable cause. In most instances a marked diminution in the size of the tumor was noticed following treatment, in addition to the effect produced upon the hemorrhage; indeed, in 12 out of the 16 patients who have ceased treatment, the tumor has entirely disappeared. In 2 of these patients, the growth extended to the umbilicus, but after five and four years respectively it can no longer be found. Pfahler says that he has never seen malignant degeneration of a myoma follow *x*-ray treatment, and does not consider the danger from this possibility very great. Where the patient is very anemic,

he always insists on rest in bed after the first series of treatments, as these are often followed by somewhat increased hemorrhage. In one of his cases treatment was followed by amenorrhea and disappearance of the tumor; after a time, however, menstruation was reëstablished in normal amount, and the patient has continued in perfect health. The treatment is given in series of from three to nine applications, generally on successive days, each series being followed by an intermission of about a month. If bleeding has not ceased after six treatment-series, the case should be considered unsuited for this form of therapy, and surgical intervention considered. Pfahler believes that the best results will be obtained if the cases are carefully selected by a trained gynecologist and treated by an expert Röntgenologist. He does not, as a rule, advise applying *x*-ray treatment to women aged under forty years, although in exceptional instances this may be permissible.

The Use and Abuse of the Curette.—In an article which FRANK states is intended primarily for the *general practitioner*, he (*New York Med. Jour.*, 1913, xcvii, 808) calls attention to the excessive fondness which apparently still exists among the profession for the curette, a condition which not infrequently leads to serious consequences. In running over the records of 2000 consecutive cases seen in his dispensary service, Frank has found that considerably over one-fifth of these women had at some time or other been curetted; several of the patients upon whom this operation had been performed were unmarried, or had not yet reached the age of puberty. Of 721 cases of abortion, either spontaneous or induced, nearly every second patient had been curetted; in 20 instances the operation had been performed post partum, in 32 cases sterility was the indication, in 36 menorrhagia or metrorrhagia, and in 40 leukorrhea. Frank considers that in practically all these cases the curette had better have been left unused. Whereas 50 per cent. of the cases curetted post abortum showed subsequently inflammatory lesions of the adnexa or parametrium, these were present in only 12 per cent. of an equal number not curetted. To curette post partum is, in Frank's opinion, never justifiable, as it only breaks down the natural defenses of the uterus, and opens wide paths of invasion to infectious organisms. While careful and light curettage post abortum may be justifiable, and at times even necessary when the patient is in a hospital, surrounded by all the facilities which it provides, Frank believes that the general practitioner will come out much better in the long run if he refrains from applying this treatment under the unfavorable conditions usually found in private practice, and adopts almost exclusively the purely expectant policy in treating these cases. He believes, further, that in the small percentage of cases in which curetting apparently does good in sterility or "endometritis" (*i. e.*, leucorrhea), it is really the preceding *dilatation* which has been of benefit. Frank does not wish to be misunderstood as desiring to banish the curette altogether, since it has, when properly used, a position of vital importance in our gynecological armamentarium; this position is as a diagnostic rather than as a therapeutic weapon, however. In cases of irregular bleeding—especially the climacteric and preclimacteric menorrhagias and metrorrhagias—it

should be obligatory on the attending physician to use the curette, but not so much with the expectation of curing the condition as of removing material for histological examination. He believes that were the profession as a whole fully alive to the importance of this point, the public could be educated within a couple of years to demand such an examination, just as they now demand a Wassermann test in suspected syphilis.

OTOLOGY

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The Function of the Auricle.—The widely varying opinions as to the acoustic and protective value of the human auricle are carefully presented by H. FRANKE (*Beitrage zur Anatomie, Physiologie, Pathologie, und Therapie des Ohres, der Nase, und des Halses*, vi, No. 3, 219) with a degree of detail which makes, in each instance, an abstract of the conclusion drawn from the recorded observation of the individual writer. The papers which form the basis of Franke's review, twenty-five in number, range from Buchanan in 1828 to the present day, and are widely divergent in their deductions; in some instances the auricle being regarded as of importance in the collection, the reflection, the reinforcement of sound waves, and as a resonator for certain tones and, moreover, of definite assistance in the determination of the direction of a sound source. Burkner, for example, in a case in which one auricle had been lost through accident, without injury to the middle, or internal ear, the tragus remaining uninjured, the hearing for the watch was found to be equal in the two ears so long as the sound source was held opposite the tested ear in the line of the long axis of the external auditory canal; a departure from this line, in any direction, exhibited a much more rapid falling off in the recorded hearing distance of the ear without an auricle, the conclusion of the observer being, naturally, that the auricle is important for the perception of sound by its collection of sound waves and their corresponding transmission of the sound waves to the middle ear mechanism and the perceptive apparatus. Burkner also found that with only the sound ear exposed the patient was accurate in his determination of the direction of a sound source, but that this was by no means the case when the perfect ear was tightly stopped and an attempt made to determine the direction of a sound source by means of the mutilated ear only. When both ears remained free the determination of the direction of a sound source was, in the majority of instances, correct, but more mistakes were noted when the sound came from the direction of the mutilated ear. Gradenigo drew similar conclusions from a corresponding case, observed by him, and confirmed the observations as to the lesser ability to determine the direction of a sound source on the affected side. Schaefer regards the human auricle as of funda-

he always insists on rest in bed after the first series of treatments, as these are often followed by somewhat increased hemorrhage. In one of his cases treatment was followed by amenorrhea and disappearance of the tumor; after a time, however, menstruation was reëstablished in normal amount, and the patient has continued in perfect health. The treatment is given in series of from three to nine applications, generally on successive days, each series being followed by an intermission of about a month. If bleeding has not ceased after six treatment-series, the case should be considered unsuited for this form of therapy, and surgical intervention considered. Pfahler believes that the best results will be obtained if the cases are carefully selected by a trained gynecologist and treated by an expert Röntgenologist. He does not, as a rule, advise applying *x*-ray treatment to women aged under forty years, although in exceptional instances this may be permissible.

The Use and Abuse of the Curette.—In an article which FRANK states is intended primarily for the *general practitioner*, he (*New York Med. Jour.*, 1913, xcvii, 808) calls attention to the excessive fondness which apparently still exists among the profession for the curette, a condition which not infrequently leads to serious consequences. In running over the records of 2000 consecutive cases seen in his dispensary service, Frank has found that considerably over one-fifth of these women had at some time or other been curetted; several of the patients upon whom this operation had been performed were unmarried, or had not yet reached the age of puberty. Of 721 cases of abortion, either spontaneous or induced, nearly every second patient had been curetted; in 20 instances the operation had been performed post partum, in 32 cases sterility was the indication, in 36 menorrhagia or metrorrhagia, and in 40 leukorrhea. Frank considers that in practically all these cases the curette had better have been left unused. Whereas 50 per cent. of the cases curetted post abortum showed subsequently inflammatory lesions of the adnexa or parametrium, these were present in only 12 per cent. of an equal number not curetted. To curette post partum is, in Frank's opinion, never justifiable, as it only breaks down the natural defenses of the uterus, and opens wide paths of invasion to infectious organisms. While careful and light curettage post abortum may be justifiable, and at times even necessary when the patient is in a hospital, surrounded by all the facilities which it provides, Frank believes that the general practitioner will come out much better in the long run if he refrains from applying this treatment under the unfavorable conditions usually found in private practice, and adopts almost exclusively the purely expectant policy in treating these cases. He believes, further, that in the small percentage of cases in which curetting apparently does good in sterility or "endometritis" (*i. e.*, leucorrhea), it is really the preceding *dilatation* which has been of benefit. Frank does not wish to be misunderstood as desiring to banish the curette altogether, since it has, when properly used, a position of vital importance in our gynecological armamentarium; this position is as a diagnostic rather than as a therapeutic weapon, however. In cases of irregular bleeding—especially the climacteric and preclimacteric menorrhagias and metrorrhagias—it

should be obligatory on the attending physician to use the curette, but not so much with the expectation of curing the condition as of removing material for histological examination. He believes that were the profession as a whole fully alive to the importance of this point, the public could be educated within a couple of years to demand such an examination, just as they now demand a Wassermann test in suspected syphilis.

OTOLOGY

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The Function of the Auricle.—The widely varying opinions as to the acoustic and protective value of the human auricle are carefully presented by H. FRANKE (*Beitrage zur Anatomie, Physiologie, Pathologie, und Therapie des Ohres, der Nase, und des Halses*, vi, No. 3, 219) with a degree of detail which makes, in each instance, an abstract of the conclusion drawn from the recorded observation of the individual writer. The papers which form the basis of Franke's review, twenty-five in number, range from Buchanan in 1828 to the present day, and are widely divergent in their deductions; in some instances the auricle being regarded as of importance in the collection, the reflection, the reinforcement of sound waves, and as a resonator for certain tones and, moreover, of definite assistance in the determination of the direction of a sound source. Burkner, for example, in a case in which one auricle had been lost through accident, without injury to the middle, or internal ear, the tragus remaining uninjured, the hearing for the watch was found to be equal in the two ears so long as the sound source was held opposite the tested ear in the line of the long axis of the external auditory canal; a departure from this line, in any direction, exhibited a much more rapid falling off in the recorded hearing distance of the ear without an auricle, the conclusion of the observer being, naturally, that the auricle is important for the perception of sound by its collection of sound waves and their corresponding transmission of the sound waves to the middle ear mechanism and the perceptive apparatus. Burkner also found that with only the sound ear exposed the patient was accurate in his determination of the direction of a sound source, but that this was by no means the case when the perfect ear was tightly stopped and an attempt made to determine the direction of a sound source by means of the mutilated ear only. When both ears remained free the determination of the direction of a sound source was, in the majority of instances, correct, but more mistakes were noted when the sound came from the direction of the mutilated ear. Gradenigo drew similar conclusions from a corresponding case, observed by him, and confirmed the observations as to the lesser ability to determine the direction of a sound source on the affected side. Schaefer regards the human auricle as of funda-

mental and conclusive value to the hearing as a whole, reporting instances of progressive depreciation in the hearing power where the auricle had been mutilated or removed, and corresponding improvement in the hearing when means were taken to convey sound directly into the affected ear. Johannes Müller and Gigel, with other observers, concluded that the principal medium for the transmission of sound waves falling upon the auricle was through the substance of the auricular cartilage itself and its consequent conveyance along the tubal cartilage of the external auditory canal to the middle ear, instancing the hearing for tones of low pitch in auscultation either by contact of the auricle directly with the body of the patient or with a directly applied stethoscopic tube. Out of the material afforded by these observations, with the addition of his own, Franke arrives at the conclusion that the auricle has one well assured function, namely, the protection of the deeper portion of the ear, in which protection the tragus, extending over the meatus, plays an important part, but he makes no allusion to the caloric value of the auricle, the increase in its circulation when exposed to cold air serving to counteractively increase the temperature of the external auditory canal and helping to maintain the normal body temperature in the drumhead and in the middle ear. Franke further concludes, on the whole, that if the auricle in man is not to be regarded as a physiologically worthless rudimentary organ, it must be admitted to have but small value in the light of its contribution to the function of hearing.

The Relationship between the Hearing for the Whisper and the Conversational Tone.—Upon the basis of the observations in regard to functional hearing tests of Wolf, Bezold, Siebenmann, and others, Julius Veis (*Archiv f. Ohrenheilkunde*, 1913, xc, 3) draws comparisons between the audible values of the human voice in ordinary conversational use and in a whisper, the former as representing tones of medium low and the latter tones of medium high pitch. For purposes of uniform testing in whispering, numerals were selected according to their presentation of low or high-pitched vowel sounds, thus affording a condensed means for speedy and accurate comparison in individual cases. The difficulty of determination of the relative pitch of whispered vowel sounds was confirmatory of the earlier observations of O. Wolf, this being in part due to the fact that the toneless whisper ranges far above the medium fundamental tone of ordinary speech, the latter being definitely a test for the medium low tones and the former for the medium high tones of the auditory scale; under these circumstances the voice test is both valuable for itself in the great majority of cases, and as an adjunct to the other forms of hearing test in common use. From his investigations carried out in cases of impairment of hearing from causes pertaining in both the middle and the internal ear, Veis draws the following conclusions: (1) The test of hearing by means of the conversation form in comparison with the parallel test in a whisper is important in cases of marked impairment of hearing (whisper less than 1m), in reference to diagnosis, therapeusis and prognosis; a test with the whispered voice alone gives no adequate determination of the actual hearing power. (2) In cases of otosclerosis and in many cases of past suppurative inflammation

of the middle ear the conversation tone was heard at a not much greater distance than the whisper, while in cases of labyrinthine deafness and in the exudative process of middle ear affection the conversation tone was heard far better than the whispered voice. (3) When the conversation tone is heard much better than the whisper there is more promise of improvement in the general hearing under treatment. (4) Improvement in hearing, in consequence of middle ear inflation, is evidenced mainly in regard to the conversation tone, the hearing for the whisper being either not at all or only slightly improved.

Clinical Observations upon a Hitherto Undescribed Form of Tuberculosis of the Middle Ear.—From a large material of cases of tuberculosis JOERGEN MOELLER (*Zeitschr. f. Ohrenheilkunde*, lxiv, 4) selected a series of cases of middle ear tuberculosis presenting symptoms the evidence and import of which seemed to have been heretofore unappreciated. In tuberculous patients who complain of no more serious symptoms than subjective noises or a diminution of hearing, objective examination shows in the early stage of the middle ear implication, appearances corresponding to those of a simple, acute, suppurative, middle ear process. The drumhead was distended, the long process of the malleus lay in a furrow or was entirely concealed by the distention of the drumhead outward, the color of the membrane was a yellowish-white, dull, and not diffusely injected as is the case in simple acute inflammation of the middle ear, but instead, against the dull yellowish white background there was a network of distended bloodvessels radiating from the manubrial plexus. Inflation of the middle ear by means of the air douch gave only temporary and partial relief from the subjective symptoms and paracentesis revealed a dry incision through a generally thickened membrane, an opening which was usually entirely healed on the following day. As a rule, in a majority of the cases, the inflammatory process either resolved or localized itself in one spot, or another of the drumhead, as a small and limited ulceration confined to only one layer of the drumhead while in other instances the necrotic process was more general in its attack, the drumhead became perforated, and the subsequent course of the case was that of the ordinary suppurative middle ear tuberculosis. The implication of the middle ear throughout evidenced itself as primarily a diffuse tuberculous infiltration of the drumhead and of the tympanic mucosa, this view being supported by the histological examination of excised portions of the drumhead.

Temporary Glycosuria in the Course of Suppurative Middle Ear Disease.—Upon the basis of the following experience ALFRED ZIMMERMANN (*Zeitschr. f. Ohrenheilkunde*, lxvii, Nos. 3 and 4, 217) was led to make an extended review of the literature concerning the question of the relationship of the presence of sugar in the urine for short periods, during the progress of a suppurative process in the middle ear. The patient was a man, aged twenty-four years, who, in sequence of a cauterization of the left inferior turbinate, had, two days later, an acute inflammation of the right, middle ear from which paracentesis of the drumhead liberated a serous discharge; there was also

a light implication of the left ear; on the following day there was a slight further rise in temperature and a copious purulent discharge from the right ear exhibiting, both microscopically and by culture, staphylococcus, streptococcus, and psuedodiphtheria bacillus. The congestion of the left middle ear rapidly decreased with an ultimate return to normal, but in the right ear continued and increased, but without evidence of intracranial complications. The urine, as examined when the case was first seen, was practically normal, without a trace of albumin or of sugar, but on the seventh day, under the same dietary conditions as before, a large percentage of sugar was found in the urine. In the subsequent course of the case, with a gradual decrease in the local, aural, disturbance, the percentage of sugar proportionately decreased, and finally disappeared not withstanding a resumption of the ordinary diet which had, for a time, been suspended. Beginning with the investigations of Claude Bernard upon the effect of injury in the region of the floor of the fourth ventricle upon sugar elimination, and following through the clinical literature of the subject, Zimmermann concludes that suppurative inflammation of the middle ear, even when it does not extend beyond the boundary of the temporal bone, especially at the acme of its clinical evidence of activity, may be the cause of a transitory glycosuria which should in no way be confounded with, or lead to an oversight of, the really serious renal lesion of which this symptom might be an evidence.

PATHOLOGY AND BACTERIOLOGY

UNDER THE CHARGE OF

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The Bordet-Gengou Bacillus of Whooping Cough.—MALLORY, HORNOR, and HENDERSON (*Jour. Med. Research*, March 1913) have completed the proof according to Koch's postulates that the recently described bacillus is the actual cause of whooping cough. They have been able from sputum to obtain pure cultures, to produce the lesions which they have shown to be characteristic in young animals, and in four instances have obtained the organism again from these subjects in pure cultures. They consider that a vaccine or antitoxin is probably within reach.

The Effect of the Spleen and Splenic Extract upon Malignant Tumors.—OSER and PRIBRAM, from Prof. v. Eiselsberg's clinic (*Zeitschr. f. Exper. Path. u. Ther.*, January, 1913, Band xii, Heft 2) undertook experimental work upon the effects that can be produced on malignant tumors by the absence of the spleen as well as by splenic

extracts. Oestrich had supposed that chondroitin-sulphuric acid was responsible for certain favorable effects on carcinomatous growths, and Oser and Pribram used his medium, composed of sodium chondroitin-sulphate and β-eucaine, upon a series of patients, but were entirely disappointed by the lack of good results. Considering that the spleen is almost as efficient as the bone marrow as a site of formation for antibodies, and that agglutinins can be demonstrated in the spleen earlier than in the blood, Braunstein obtained good results by removing the sterile spleen from cancer-mice and injecting the extract of the spleen in salt solution into other cancer-mice. He first used mice which had been injected with carcinoma, and removed the spleen before any tumor appeared. Of other cancer-mice so injected, one-fourth of those surviving showed tumor recession. One-third died of the injection. When he took the spleen from mice with well developed tumors, 6 of 15 mice injected died, but 5 of the remaining 11 showed recession. Yet again, he took the spleen from mice injected intraperitoneally repeatedly with carcinoma and sarcoma extract, four to six days earlier; this was injected into 45 cancer-mice with 3 deaths; in 6 recession of growth occurred, in 3 cessation of growth. Of 7 sarcoma-rats similarly tested, 6 showed regression. Braunstein's conclusions were that the spleen possesses a highly developed power of resistance against tumor growth, while, on the contrary, splenectomized animals are more liable than normal animals to the inroads of malignant growth. Rohdenberg and Johnston made observations that were parallel upon the thymus, pancreas, spleen, hypophysis, and testes, showing that after extirpation of the thyroid, thymus or testes the animal had a lessened resistance to carcinoma. Oser and Pribram's experiments support the views of Braunstein, and they show measurements and pictures of tumors indicating regression, and also the comparatively quicker growth of tumors in previously splenectomized animals. Spleen extract was efficient in the possession of antibodies, while blood removed at the same time failed to show such qualities.

Anaphylotoxin, Peptotoxin, and Anaphylaxis. — Besredka, Ströbel, and Jupille (*Annal. de l'Inst. Pasteur*, March, 1913, xxvii, No. 3) give details of some interesting experiments upon anaphylotoxine, a name which Friedberger gives to what he supposes to be the active agent in anaphylaxis; he considers that the anaphylactic state of an animal with regard to an albumin is due to the appearance of precipitin in its serum, and anaphylactic shock is the result of combination of the precipitin with the alexine of the animal. This being the case, one had only to inject an unprepared animal with the test-tube preparation of precipitin and alexin, and the result showed that the intravenous injection was highly toxic to the animal. This substance Friedberger called *anaphylotoxine*. In the words of Besredka, Ströbel, and Jupille, "the fortune of anaphylotoxin was made, and almost any bacillus, however slightly pathogenic, could apparently be proved to possess its anaphylotoxin." We were in a fair way to find that even infectious diseases were the work, not of specific pathogenic agents so much as of anaphylotoxin. Besredka, Ströbel, and Jupille have endeavored to stem the triumphant march of the ana-

phylotoxins by attempting to find out if they are the specific poisons of anaphylaxis. To obtain a microbic anaphylaxis, it was necessary to make an alexin act on microbes and specific serum; it was then discovered that specific serum was unnecessary, and that it sufficed to make the alexin act on the bacilli alone. Still later the authors have simplified the technique by withdrawing from it the bacilli, making the alexin act on the sterile medium without bacilli; they have obtained thus a toxic substance which has all the characters of anaphylotoxin. This they have called peptotoxin because of its relationship with peptones, in preference to anaphylotoxin, since they consider it to have no relation to anaphylaxis. For purposes of comparison they have taken guinea-pigs injected with anaphylotoxin, peptotoxin, and peptone, followed by bacterial vaccination in progressively increasing doses quickly administered. The results have been to show that anaphylotoxic shock and anaphylactic shock are two entirely different things, and that vaccination following anaphylotoxin, peptotoxin, and peptone, presents well-defined characters common to these three substances, and very distinct from the characters which designate the ordinary anti-anaphylaxis. The toxic effects produced by the peptone and its derivatives may exactly copy the effects of anaphylaxis, but the "peptonic shock" does not in the guinea-pig produce any protection against anaphylactic shock. Typhus anaphylotoxin can be injected safely into the venous system in guinea-pigs in increasing doses, injected at short intervals, and the same is true of peptotoxin and of the peptone; in all three cases, however, the weight of the animal and the dose of poison must be reasonably coördinated, and for all three it is likewise necessary that the venous circulation should be used. Anti-anaphylactic vaccination does not possess these characters, and Besredka, Ströbel, and Jupille conclude that the phenomena which they attribute to anaphylotoxin, peptotoxin, and peptone have nothing in common with true anaphylaxis. We are thus, they think, carried back once more to our original conception of anaphylaxis and anaphylactic shock, which excludes the idea of intoxication by a particular substance such as anaphylotoxin. They compare the process of desensitization which occurs during the anaphylactic state to a rapid decoloration or decompression: when such decompression or decoloration occurs in a gradual and progressive manner, the process of anti-anaphylaxis is being accomplished.

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